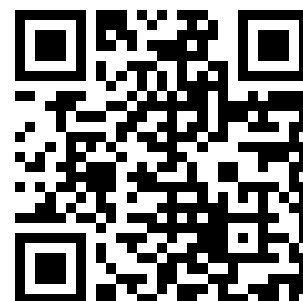
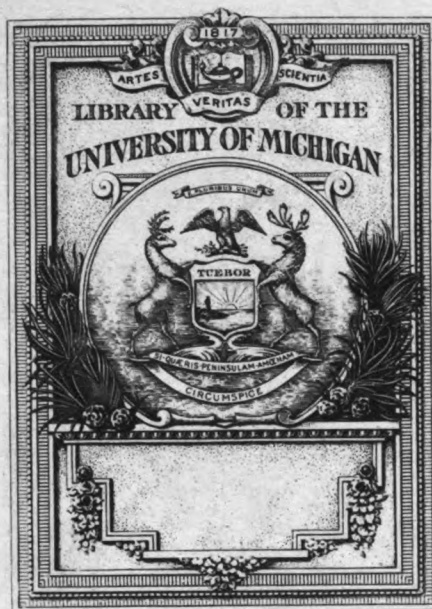

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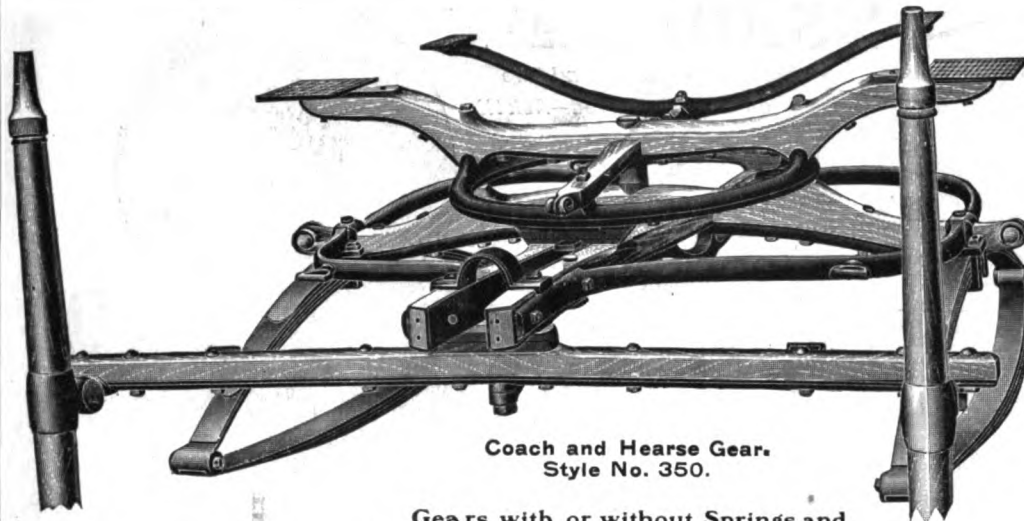
AMERICAN BLACKSMITH

BUFFALO
N.Y. U.S.A.

A PRACTICAL JOURNAL OF BLACKSMITHING

OCTOBER 1902

\$1.00 A YEAR
10¢ A COPY



Coach and Hearse Gear.
Style No. 350.

Gears with or without Springs and Axles Welded and Clipped, with Top Gear and Spring Bars ready to receive Body. Also Wheels, Shafts, Poles and Eveners, Ironed Complete, a Specialty.

Wrought-Iron Spring Blocks and other Forgings of our make for sale by all Dealers in Carriage and Wagon Hardware.

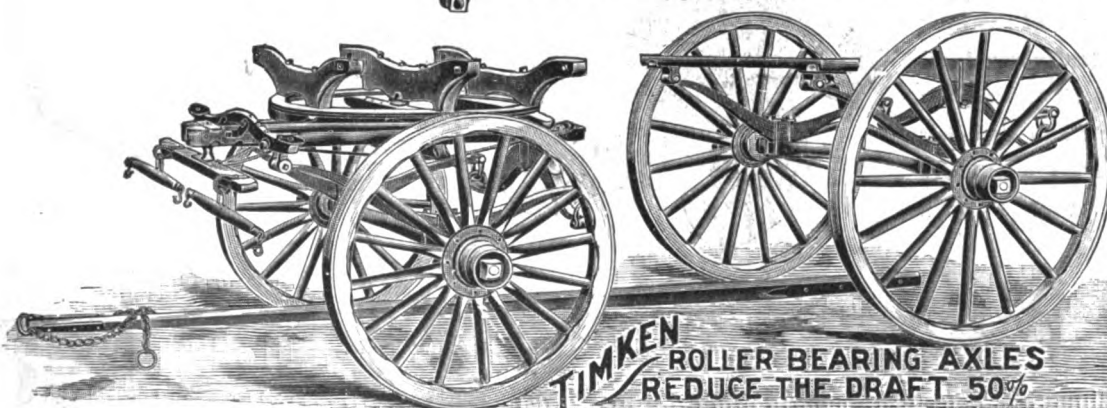


Concord Three-Spring Express Gear.
Styles No. 301 to 306.

The Selle Gear Company

SOUTH HIGH STREET, AKRON, OHIO, U. S. A.

THE
**SELLE
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CO.**
MANUFACTURERS OF
COACH, HEARSE
AND
SPRING WAGON
GEARS
AND
WAGON SPECIALTIES



TIMKEN
ROLLER BEARING AXLES
REDUCE THE DRAFT 50%

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Address :
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Use Western
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Export Codes.

\$8**BUFFALO BLOWERS****\$8**

The Most Improved and Powerful Hand Blowers Made.

"SPECIAL HARVEST PRICE"*A Buffalo No. 9 Blower Complete with Tuyere Iron***\$8.00 NET***Your Dealer will Send One
on Trial if desired—Ask Him***DON'T BE
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By Illuminated Advertisements. Ask any Millwright or Machinist about Wear of Spiral Gears ☞ ☞
WE DON'T USE THEM

Buffalo Blowers

are built with machine cut gears and are guaranteed for years—not only for ten days ☞



Action Smooth Operation Easy No Lost Motion
No Complicated Machinery to Get Out of Order

**SIMPLE! COMPACT!
DURABLE! EFFICIENT!**

The gears are machine cut and enclosed in a dust-proof frame. The frame is made perfectly tight so that the oil may be maintained at the bottom of the case. In this the largest of the gear wheels constantly revolves, throwing the oil thoroughly over the parts and affording ample lubrication to all bearing surfaces. ☺ ☺ ☺ ☺ ☺



*Air Blast
Strong and
Uniform*

*Write for
Latest
Catalogue
JUST OUT*

**PRICE
8
DOLLARS**

**\$8****Buffalo Forge Company,****BUFFALO, N. Y., U. S. A.****\$8**

SAFETY AND COMFORT

Provide for the Safety and Comfort of the Horses and you'll Please the Owners and Drivers—Provide for Their Safety and Comfort, as well. To Please Customers is Good Business. ♣ ♣ ♣ ♣ ♣ ♣

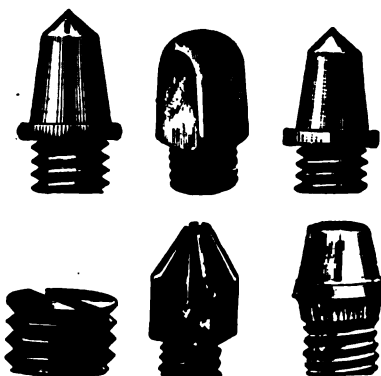
NEVERSLIP CALKS

ENABLE HORSES TO DO
THEIR WORK IN SAFE-
TY AND COMFORT—TO
WORK FASTER, BETTER

They Prevent Slipping Absolutely

EASILY INSERTED, EASILY REMOVED, THEY MAKE NO TROUBLE

THE ONLY SELF-SHARPENING CALKS.



Shoes already drilled,—costing only four cents a set for drilling. All styles in sizes corresponding to all standard makes.

Calks all ready to screw into the shoes in six different shapes to fit your horse for any kind of work.



THESE GOODS ARE SOLD ONLY TO HORSESHOERS

Catalogue and Full Information on Request

SAVE THE COUPONS

WHICH ARE PACKED IN EVERY BOX OF CALKS

AND GET A SET OF TOOLS FREE

THE NEVERSLIP MANUFACTURING CO.

New Brunswick, N. J.

Branch : 242 RANDOLPH STREET, CHICAGO, ILL.

**Jobbers and Dealers Claim It Is The Easiest Sold
Blacksmiths Say It Is Worth Its Weight In Gold**

FREE TO ALL BLACKSMITHS!

The Only Hand Blower

Ever built that can positively compete with Power Blast. It places the blacksmith on equal footing with the millionaire manufacturer.

WITH A GUARANTEE
of two hours more work per day and with a saving of 75 per cent. in labor in making blast, can any Blacksmith refuse a 10 Days' Free Trial of a No. 400 Steel Blower, which is sold at a price within the reach of all?

Send Us Your Address
on a Postal Card and we will mail you a Handsome Souvenir Button of the No. 400 Blower. **FREE.**

U. S. Patents covering the No. 400 Steel Blower and Steel Forges granted June 11, July 30, 1901, and April 15, 1902.

Patent Numbers:
676,322 34,882
676,323 34,883
676,324 34,884
34,880 34,885
34,881 697,629

— ALSO —
Great Britain Patent No. 9,662, May 25, 1900.

Write for our 1902
212-page Catalogue
Illustrating the Largest and most Up-to-Date
Line of Blacksmiths' Tools manufactured
under one control in the world.

We authorize all Jobbers to give to Blacksmiths the No. 400 Champion Steel Blower on 10 Days' Trial at their Own Fire. This trial is entirely FREE as we pay all freights for the return of the Blower to our works if it does not improve your FIRE 25 per cent., or in other and plainer words, if it will not improve your Blast so that you can do at least Two Hours more Work Per Day than you are now doing with any other hand Blower, Forge or Bellows, and with a saving of 75 per cent. in labor in making your Blast. **Blacksmiths:** If the No. 400 Champion Steel Blower will accomplish for you what we say, can you longer afford to do without it? Figure what two hours' more work would mean to you in dollars and cents per year of 300 working days, and then figure the small investment it takes to place the No. 400 Steel Blower to your fire. Remember, we ask No Favors, we want you to use the Blower 10 days in your own shop and at your own fire and with your own hands, and if it is not found even better than we claim, the Blower is to be shipped to our works; we pay all freights. If the above FREE offer does not convince you that you can no longer afford to use any other Blower, Forge or Bellows, write us and tell us what more we can do to get the No. 400 Blower in your hands. No correspondence under the sun is as satisfactory as the Blower itself, working at your own fire, under your own management 10 days; and this is why we make the 10 days' Free Offer.

OUR GUARANTEES

- 1st.** We guarantee the No. 400 Steel Blower the only Blower ever built with Direct Drive Spiral Gearing and Frictionless Ball Bearings.
- 2d.** We guarantee the No. 400 Steel Blower Direct Drive Spiral Gearing the only practical and highly durable High Speed Gearing known; because eight Full Teeth are in mesh in the Spiral and Spiral Gear at all times; the spiral itself being the only part of the Gearing that reaches high speed, as the Spiral Gear is six inches in diameter and therefore runs very slow.
- 3d.** We guarantee the No. 400 Steel Blower, with its white heat pressure-blast fully equal to the best power blower blast.
- 4th.** We guarantee the No. 400 Steel Blower will increase the earnings of every fire over and above any other means of making hand blast enough to pay first cost of the Blower five to ten times every year it is used.
- 5th.** We guarantee the No. 400 Steel Blower to run as solid and noiseless one year from date as on the day it is bought.

CHAMPION BLOWER & FORGE CO.

LANCASTER, PA., U. S. A.

THE BRADLEY

SHAFT COUPLING



OPEN

*ALL STEEL
ALL RIGHT
ALL THE TIME*

IT IS a thoroughly practical, quick shifting, ball bearing and absolutely noiseless Carriage Shaft Coupling, complete in itself, with no loose parts or pieces, and always ready.



CLOSED

IT AUTOMATICALLY TAKES UP ITS OWN WEAR

And with It Shafts and Pole may be exchanged in 10 SECONDS.

IT IS MADE ENTIRELY OF STEEL, BY SKILLED WORKMEN, IS AMPLY STRONG AND WILL OUTWEAR ANY VEHICLE TO WHICH IT IS ATTACHED.

THE best carriage makers everywhere use and endorse them. Blacksmiths can make a good profit by attaching them to old or new vehicles. Sold by the leading jobbers in carriage goods throughout the country. We will be pleased to send you printed matter and prices on request. 2 2
"Quality and Advantages considered, the Bradley Shaft Couplings are the cheapest on the market."

It Has Been On The Market 10 Years!

And there are over 500,000 Pairs of them in use and giving perfect satisfaction.

They are made in four sizes to suit vehicles with axles from $\frac{3}{4}$ to $2\frac{1}{4}$ in. in diameter.

One Hand is the Only Tool Required to Operate It.

C. C. BRADLEY & SON

SYRACUSE, N. Y.

ROYAL

WESTERN CHIEF

Reliable
Our Choice
Your Choice
America's Choice
Leads Them All



HANDSOMEST: Because its constructive design is symmetrical, attractive and beautiful.

SIMPLEST: Because fan case and column stand (2 parts only) is about all there is of it.

BEST: Because made of the best material, by the best workmen and best mechanical experience that can be obtained.

SUPERIOR POINTS.

No Belts, no Clutches, no Ratchets.

The blower case oscillates on its bearing, permitting nose of case to point **down** or **out** or **up**, as may be desired; meeting any angle of blow pipe, thereby saving one elbow and 10 per cent. of blast force; besides valuable room occupied by other blowers.

The crank turns **forward** or **backward**, as suits the operator.

The gears are Phosphor Bronze and Steel, cut on the most scientific principle; they are **flat**, and **straight cut** (no spiral or worm gears); which combined with Steel Shafts and Composition Bearings made and assembled perfectly, run noiseless, and makes this the best blower in the world.

The Gear Case is oil tight and dust proof, permitting gears to run in a bath of oil.

The Blast is very powerful, and as positive and steady as a power blower, and takes less labor to operate than others. The after blast is strong and lasting.

The Column Stand and Iron Base give a solid, non-trembling foundation.

The room it takes is less than any other blower.

ROYAL In Every Sense

MADE BY
CANEDY-OTTO MFG. CO.
CHICAGO HEIGHTS, ILL.

SOLD BY
FIRST-CLASS DEALERS
EVERYWHERE



*You Are ALL RIGHT
When you Buy a*
PETER WRIGHT

A GUARANTEE

Now goes with every

PETER WRIGHT

Patent, Solid Wrought

ANVIL

With Special Steel Face.

WHILE other makers recognize the Peter Wright as the Standard Anvil of the World by claiming that theirs is "just as good," this anvil has never before been warranted, for the reason that the makers cannot make a better anvil under a guarantee than they have always made without. The guarantee which will hereafter go with every Peter Wright Anvil is designed to satisfy the most exacting of customers.

You are cautioned in buying to see that each Anvil is stamped with the full Trade Mark on one side and has the Green Label affixed to the other. These celebrated Anvils may be obtained from all the

**PRINCIPAL
HARDWARE
DEALERS.**

If any inherent defect is hereafter discovered in a Peter Wright Anvil, report the nature of it to the dealer from whom you purchased it, or to your regular dealer, and he will see that your claim is promptly investigated.

REPORT THE NATURE OF IT TO THE DEALER FROM WHOM YOU PURCHASED IT, OR TO YOUR REGULAR DEALER, AND HE WILL SEE THAT YOUR CLAIM IS PROMPTLY INVESTIGATED.



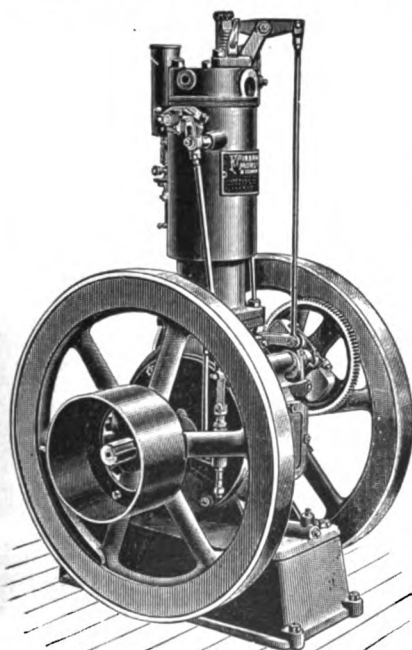
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Agents for the Manufacturers.

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1½ to 54 HP.

Horizontal and Vertical

OUR VERTICAL ENGINES Are Specially Adapted for Use in Blacksmith Shops.

Built in 1½, 2½ and 5 HP. Sizes.

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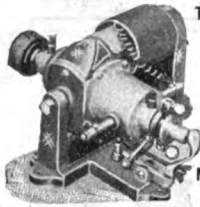
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To Owners of Gasoline Engines, Automobiles, Launches, Etc.
The Auto-Sparker
 does away entirely with all starting and running batteries, their annoyance and expense. No belt—no switch—no batteries. Can be attached to any engine now using batteries. Fully guaranteed. Write for descriptive catalogue.
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Blacksmiths' and Carriage Makers' Supplies.



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Plain Vertical Engines, 3 to 50 H. P.
 Plain Horizontal " 10 to 150 "
 Simple, Strong, Efficient, Cheap.
 Hoisting Engines, Machine Tools,
 Wood Working Machinery.

Write for Catalogue B.

Pennsylvania Machine Co.
 1233 Real Estate Trust Bldg.
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BOOB'S PATENT DROP AXLE AND SINGLE ELLIPTIC SPRING GEAR

WITH SHORT TURN FIFTH WHEEL.



Adapted for Milk, Bakery and Grocery Wagons, all complete with wheel and shaft ready for body, for \$26.50.

Send for Catalogue giving prices on a full line of

Buggy, Bike and Business Wagon Gears, Wheels, Carriage and Wagon Hardware of every description.

WILLIAM W. BOOB, 428 E. 7th St., Cincinnati, O. U. S. A.



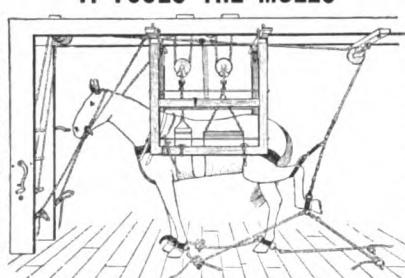
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Sold by all Jobbers in the United States and Canada.

Miniature "Aprons" showing material and how made, mailed upon application.

Sole Manufacturer
Edmund C. Beckmann
 712 North 4th St.
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IT FOOLS THE MULES



NO INJURY TO MAN OR HORSE IF A
MARTIN HORSE RACK
 IS USED IN SHOEING VICIOUS HORSES.
 SATISFACTION GUARANTEED.

BATAVIA, N. Y., JUNE 12, 1902.
 Yesterday I received a letter from a party asking for information about the working of the rack and what satisfaction it gives. I wrote him right back that we would not be without one, and that it worked to our satisfaction. I thought it would be my duty to do so as there is nothing like it.

Write for description and special price.
THE MARTIN HORSE RACK CO., Sidney, Ohio.

THE BICKNELL HARDWARE CO.,

Manufacturers and Jobbers.

Our line of **PUNCHES and SHEARS**

is the most complete and reasonable on the market.

GET OUR PRICES BEFORE BUYING.

THE BICKNELL HARDWARE CO.,
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Apple Economical Gas Engine Igniters

ARE POSITIVELY THE BEST BUILT FOR

STATIONARY, AUTOMOBILE **GAS ENGINES** EITHER TOUGH OR JUMP AND MARINE SPARK SYSTEM

We are the Leaders in the Manufacture of

IGNITING DYNAMOS, COILS AND PLUGS, MAGNETOS, GOVERNORS, ETC.

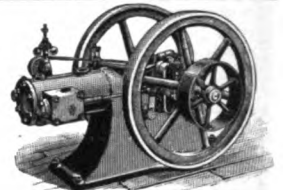
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The Dayton Electrical Mfg. Co. 88 S. ST. CLAIR STREET, Dayton, O.

GAS AND GASOLINE ENGINES.

Our engines will bear comparison with the best in their class, and are well known for their durability, simplicity and ease of operation. A big feature is our MAGNETO GENERATOR, geared direct to the engine, doing away with batteries and hot tubes.

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THE FRANK M. WATKINS MFG. CO., 537 BAYMILLER ST., CINCINNATI, OHIO.

UNBREAKABLE HACK SAWS

MADE BY NEW PROCESS

Either Fine Teeth for Brass, Copper, Thin Metal or Tubing
 or Medium Teeth for General Service

To Secure PROMPT INTRODUCTION

By Mail Prepaid

1 DOZEN 8-IN. FOR 36 CENTS
 1 DOZEN 9-IN. " 40 "
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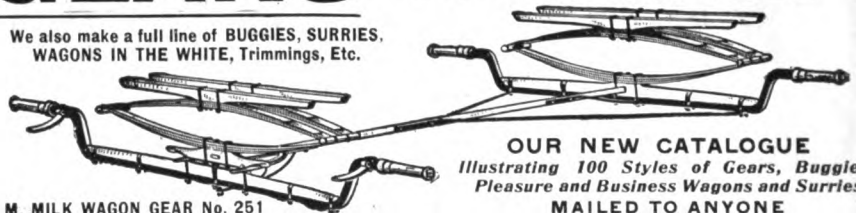
THESE SAWS ARE MUCH
 COMMENDED FOR
 GENERAL WORK

ONWARD COMPANY

531-545 W. 15th STREET, CHICAGO

GEARS-50 DIFFERENT STYLES FOR BUSINESS, SURREY AND PLEASURE WAGONS

We also make a full line of BUGGIES, SURRIES, WAGONS IN THE WHITE, Trimmings, Etc.



O. M. MILK WAGON GEAR No. 251

SCHUBERT BROS. GEAR CO.

ONEIDA, N. Y.

10,000 BLACKSMITHS, MACHINISTS and MECHANICS

answered our advertisement in the AMERICAN BLACKSMITH. All are loud in their praise.

They Say

They're hot propositions.
 They're easy to start.
 They're easy to run.
 They're easy to buy.
 They're easy to pay for.

Are you a "Hancock?"

To be a "Hancock" buy a

HANCOCK GAS OR GASOLINE ENGINE.

Can we ship you a HANCOCK today. We meet all competitor's prices, and go them one better. Write for prices and catalogue. We must have agents. Write today.

THE TREES MFG. CO.
 GREENFIELD, IND.,
 203, 212, 224 Center Street.

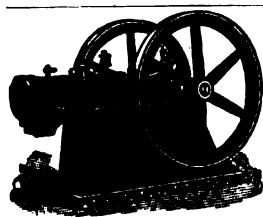
Plow and Harrow Discs Must be Kept Sharp.

OUR CLIMAX GRINDER



with DISC GRINDING ATTACHMENT will grind the LARGEST PLOW DISC or the SMALLEST HARROW DISC, and do it PERFECTLY, RAPIDLY and EASILY. You can do this work for the farmers, or sell them the machine to do it themselves; either way there is money in it for you. Be sure to write us for prices and special discounts to Blacksmiths.

SCHOFIELD & CO.,
 FREEPORT, ILL.



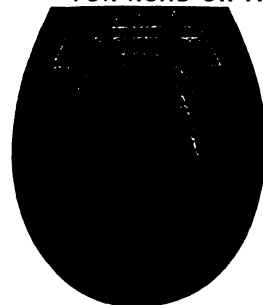
Columbus Gas and Gasoline Engines

5 to 60 H.P., inclusive
The only cheap and convenient power for Blacksmiths.
Send for catalogue 33.
Columbus Machine Co., Columbus, Ohio



WHEELS
With Rubber Tire on for \$13.75
We furnish wheels with rubber tire on for the same price as others charge for rubbering old wheels. We furnish all sizes with steel or rubber tire.
Write Quik for Catalogue

CRESCENT PADS FOR ROAD OR TRACK USE



Scientific, Sanitary
Speed-Promoting
Enduring
Will not sag or break away at the heel. Prevent the accumulation of sand or gravel. Unequaled on hard and slippery streets. The inventor is a practical horseshoer of 30 years standing. Order from your dealer.

Wm. Kilhon & Sons
20 CAMBRIA ST.
BOSTON, MASS.



Ideal Quick Shifter and Anti-Rattler

fits any wagon without changing in any way. Can change from pole to shafts without wrench. Best materials and fully warranted. Agents wanted. Send 50 cents for sample pair post-paid, and price and terms to agents.

IDEAL MFG. CO., Rochester, N. Y.



Lathes and Drill Presses

Especially for Blacksmiths and Machinists, also Hand and Power Planers and Shapers and Machinists' Supplies.

Catalogue M.

SHEPARD LATHE CO., 132 W. 2d St., Cincinnati, O.

**ADVERTISING PAGE XII
WILL INTEREST YOU.**

ESTABLISHED 1824.
A. CUTLER & SON
Office Furniture
507-509 Washington St., BUFFALO, N. Y.

AN INVESTIGATION



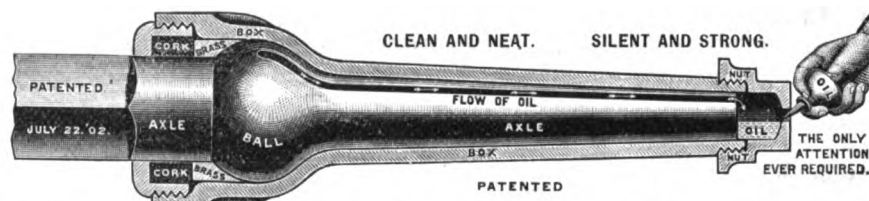
Will Prove the Merits of Our
**Paints, Colors
Varnish**

They are Money
in Pocket . . .

**Buckeye Paint
and Varnish Co.**
TOLEDO, OHIO

Carriage and Wagon Colors and Varnishes a Specialty

"The Standard Ball Axle"



Ten times longer distance than any other axle. Best for solid Rubber and Pneumatic use, as anybody can use them successfully. No attention or adjustment required, as the wheels are never taken off except for repairs. This axle is a wonder. Ask us to tell you all about it.

"BEST FOR AUTOMOBILES."

Standard Ball Axle Works,

Lancaster, Pa.

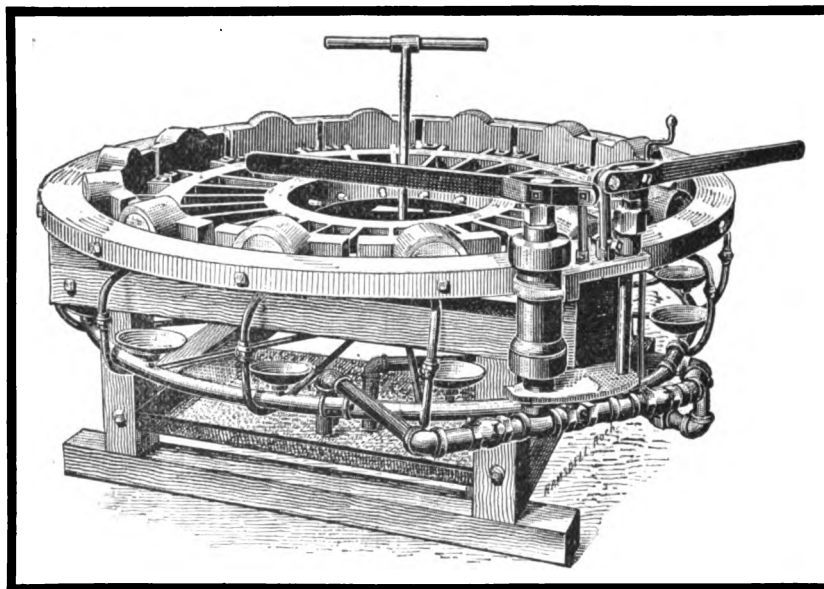
THE WEST "HYDRAULIC JUNIOR"

A New Hand Tire Setter for Repairers and Builders who have no Power or cannot afford one of our Large Machines

IT SETS THE TIRES COLD.

It is not necessary to take off old tires or remove bolts when resetting unless wheel needs repairing. Dish can be made just what is desired or necessary, and no more.

**WILL PAY FOR
ITSELF
IN A SHORT TIME.**



WILL RESET A TIRE IN ONE MINUTE.

Construction is similar in general principle (see cut) to our power machines which are so well and favorably known in nearly all parts of the world.

**QUICKEST AND
BEST HAND
MACHINE MADE.**

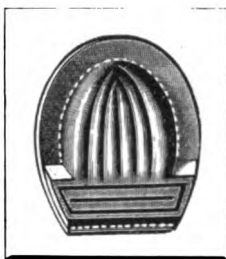
This is a First-Class Tire Setter, operated by Hand Pump, capable of giving 2,500 lbs. pressure per square inch, and will set tires 1/4 inch by 2 1/2 inches and all lighter sizes on wheels 54 inches diameter down to 34 inches.

FOR PRICE AND
TERMS, ADDRESS

The West Tire Setter Co.

"JUNIOR" DEPARTMENT.

ROCHESTER, N. Y.



THE MOST IMPROVED RUBBER PAD
OF ITS KIND.

ORDER BY NAME "A. C." THROUGH YOUR
SUPPLY HOUSE.

Consolidated Hoof Pad Co.

18 VESEY STREET, N. Y.

**BLACKSMITHS and
WAGON MAKERS**

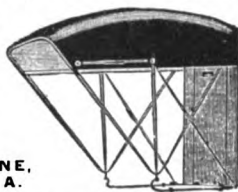
We call your attention to the LOW PRICES offered by
The Fort Wayne Iron Store Co.
and BLACKSMITH TOOLS, HORSE NAILS, HORSE
SHOES, ANVILS, FORGES, also WAGON MAKERS'
and CARRIAGE TRIMMERS' SUPPLIES, WHEELS, RIMS, SPOKES, SHAFTS and POLES,
CARRIAGE CLOTHS, LEATHER, RUBBER, Etc., Etc.

Send for our RED BOOK, the most UP-TO-DATE Catalogue, with lowest
prices, yet published. Furnished FREE to any one in the trade.

Our Top and Cushion Department is running DAY and NIGHT
to keep up with our orders. New Tops, Old Tops recovered.

SEE OUR PRICES. WORKMANSHIP GUARANTEED.

FORT WAYNE IRON STORE CO. FORT WAYNE,
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Cutters and Sleighs of All Kinds.



THIS is our twenty-third season of manufacturing
sleigh goods, and we have a more complete
assortment of up-to-date styles this season than
ever before.

We are offering special inducements in the way
of low prices for orders placed during the next
thirty days.

Write for catalogue and price-list.

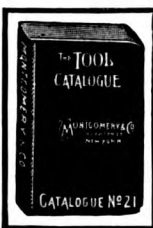
We can also furnish you some bargains in the
carriage line, as we have a stock on hand that must
be closed out to make room for our extensive line of
cutters and sleighs.

This is a rare opportunity, and if interested we
would be glad to mail you catalogue and prices.

KALAMAZOO WAGON CO.

BOX 305.

KALAMAZOO, MICH.



HIGH-CLASS TOOLS

OF NEARLY
EVERY
MAKE

ARE SHOWN IN

"The Tool Catalogue"

JUST PUBLISHED

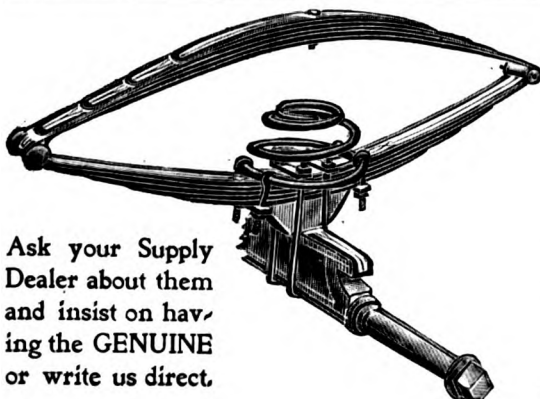
704 Pages, and a Discount Sheet, sent to any address for 25 Cents

This is the book to have if you want to buy Tools right and keep posted as "to what is doing"

MONTGOMERY & CO.

Makers and Venders of High Grade Tools and Supplies

103 FULTON STREET, - - - NEW YORK CITY



Ask your Supply
Dealer about them
and insist on hav-
ing the GENUINE
or write us direct.

**FALKENHAINER'S
Auxiliary Vehicle
Spring**

PAT. MARCH 19, 1901

It Saves

THE SPRING
THE WHEEL
THE AXLE
THE LOAD
THE HORSE
THE DRIVER

Falkenhainer & Co.
1001 N. 2ND ST., ST. LOUIS

H. D. TAYLOR CO.

101-105 OAK ST., BUFFALO, N. Y.

We make the following
Special Offer on our
Standard Bellows for
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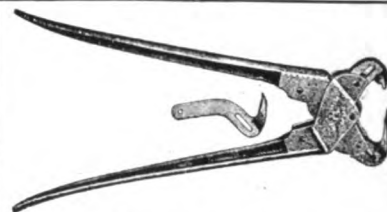
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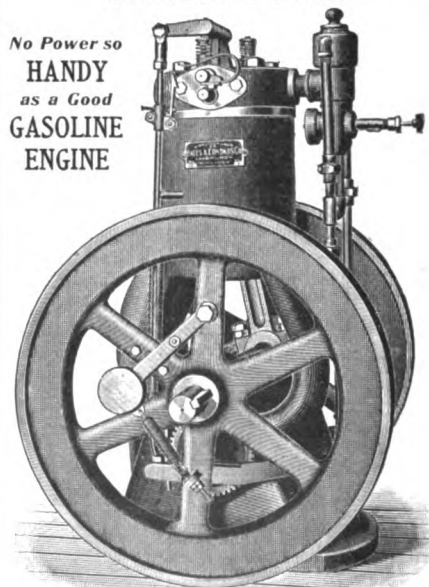
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THE AMERICAN BLACKSMITH

A PRACTICAL JOURNAL OF BLACKSMITHING.

VOLUME 2

OCTOBER, 1902

NUMBER 1

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What Are the Advantages of a Gas Engine?

For the benefit of those readers who may be thinking of putting an engine in their shops, a cash prize of \$5.00 will be given the person contributing the best article upon this subject from the blacksmith's standpoint on or before October 31st. If you have an engine in your shop, tell us plainly and to the point whether you consider the investment a good one. What are the special benefits which come from putting in power? How large should a shop be, in your opinion, before it could install an engine to advantage? If you are in a position to tell us something on this subject and have not yet done so, send in your letter without delay. Your experience should aid your brother craftsman in deciding his wisest course in this important matter.

America's Women Blacksmiths.

According to the official count of the returns of the twelfth Census, there are in the United States one hundred and ninety-six female blacksmiths. Although the proportion is of course a small one, it goes to show that if there are this many female blacksmiths in the

United States, no craft or profession is secure from invasion by them. We wish them all prosperity. Of this number the greater part, it is to be supposed, are conducting the business of a deceased husband. Some there must be, however, who get down daily to the actual use of the hammer, making the sparks fly, like the boys. We would like to learn of these particular women blacksmiths. Do any of our readers know of a real woman blacksmith? We will suitably reward any one who will send us the name, address, and if possible a photograph, of any of these daughters of toil. We would prefer photographs of them at work, if they are to be had.

Keeping Up With the Times.

What proportion of your profits are you spending on new tools, improved machinery, helpful literature and other aids in the industrial race? What are you doing, in other words, to keep up with the times? It is characteristic of the large successful manufacturer of these days that he throws machines out of his shop, not when they become worn out, but when improved machines may be had which will do the work quicker, better or cheaper. It is just as important for the small manufacturer and artisan to thus keep abreast of the times as it is for the larger manufacturer. Don't think that because the other fellow is satisfied to get along always with the tools of his ancestors that you also must needs do the same. Be a leader and not a follower. Increased trade invariably follows an exhibition of enterprise on the part of anyone.

How much money are you spending for new tools? What books and journals relating to your work are you reading? How are you keeping abreast in the march of progress? Have you for instance considered whether it would pay to put in an engine? It is but little trouble to obtain an estimate of the cost of improvements or new equipments. The advantages are usually most readily apparent and well worth considering.

Volume Two.

The present issue marks the beginning of a new volume. A few words as to the ensuing publication year would not be out of place. The general policy laid down by THE AMERICAN BLACKSMITH at the beginning of the first volume will be followed out, unaltered. The idea is to give the blacksmithing, horseshoeing and carriage building public a modern trade journal which will be a direct aid to their every day work, a paper worth all and more than its subscription price. The reading columns of THE AMERICAN BLACKSMITH are for its readers, first, last and always, and matter for those pages is selected solely on the basis of its interest and value to readers. No considerations of advertising will influence the insertion of any matter in these columns. The ordinary trade puff and its colleagues, the stale clipping and funny story, will be conspicuous by their absence. Twenty pages of reading each month, all meat and no chaff, is the guarantee to subscribers. The staff of regular contributors embrace the foremost craft authorities in their respective fields.

The journal in the coming volume is to be bettered in many respects, the standard maintained or raised. Our idea is to secure introduction of the paper to a large circle of readers, feeling assured that after a year's acquaintance, none will care to do without it. When your subscription has expired, the publishers will appreciate the encouragement which a prompt renewal gives them.

The Decorative Spirit.

An increasing tendency toward ornamentation seems to be one of the evidences of our advancing prosperity. A nation, in effect a composite individual, once overriding the shoals of forced economy, devotes an ever increasing quota of attention to art and culture. Evidences of this spirit are to be seen on every hand. Architecture is its veritable handmaiden. The metal

worker feels its influence also. Utility comes with him to be less and less the sole consideration. The straight lines, the sharp angles and the bare outlines of our iron work give way to forms of surpassing grace and symmetry. The value of the decorative side should not be underestimated.

The accompanying engraving shows a handsome wrought-iron piece from the forge of John Booth, 114 E. Lake Street, Chicago, Ill. It is hand-work throughout, the leaves being cut on a band saw and hammered into shape.

Axle and Tire Setting.

SANDFORD GRIMES.

In filling a patent hub, I first take all the rivets out, take the hub apart, make the flanges true and smooth. Then I put the hub together, leaving the box out. I have a $1\frac{1}{2}$ -inch rod with good threads and with a ring welded around it about ten inches from the thread end, large enough to cover the end of the hub well. The rod extends down and has an eye on the end to fasten to the wheel bench. I put this rod through the hub, then cut my spokes just to fit the hub, dip them in hot glue and drive them nearly straight. I have a wrench six feet long that gives me great leverage. I tighten down a little and then drive the spokes up or almost up. Next I take the wrench and tighten all it will bear and then put on the rim and leave a good opening. Put on the tire next, good and tight, and settle the spokes by striking on each one of them. Then put the rivets in, leaving a good round head on them. Now loosen the clamp and put the box in, and the wheel is done.

In setting axles, $\frac{7}{8}$ of an inch up to one inch, I give $\frac{1}{4}$ of an inch gather, and see that both wheels are the same. Then set to a plumb bottom spoke, which leaves the width about five feet one inch on most common buggies. The standard track being five feet two inches, it will let the buggy follow the wagon ruts

on rough roads, as the rims are narrow.

As to setting tires on a wheel that is solid with nothing more the matter than a loose tire and spokes loose in the rim, I wedge the spokes, setting wedge cross-wise with the rim, then cut off the end of spokes just below the rim so that the tire will not rest tight against it. Then I shrink the tire on both sides about the same. If very loose, I give about $\frac{1}{8}$ inch draw on a low wheel. Then heat tire, not hot enough to burn wood, put on, and if there are no openings in wheel, I put bolts in by the time the tire is cold without boring the fellows any.

Cutter and Sleigh Painting.

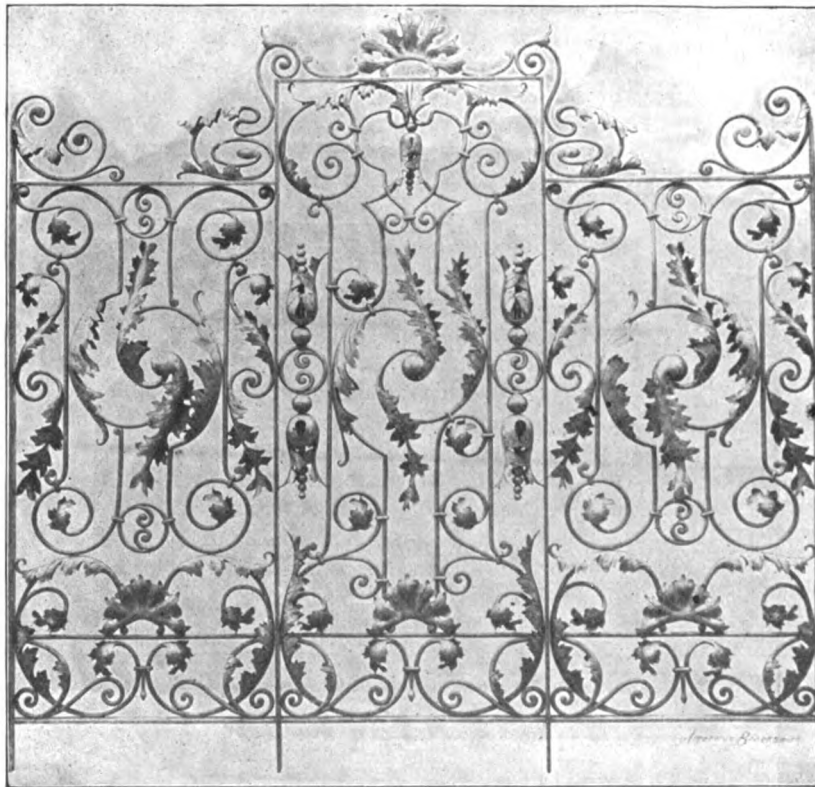
M. C. HILLICK.

The close of the country fair season brings to the paint shop a period of

imposing city establishment with its brigade of silk hat painters; and in respect to seasons, it has application with greater emphasis to the cutter and sleigh season than to that of the carriage and wagon. For of all vehicles which afford comfort and pleasure to the public, the cutter or sleigh is by far the most elusive, or rather, is made so by its owner.

In odd niches and dark corners, from cellar to hay-loft, the sleigh equipment is found secreted, and it often requires first-rate detective ability to disclose the whereabouts of said equipment before snow fall. Hence it is a case of getting out and coming in personal contact with the sleigh owner, and using the expert logic of business, in order to meet your competitor half way and acquire at least a fair share of local trade. The time to harvest the cutter and sleigh crop is when the crop is ripe, and the harvesting season is principally confined to the latter portion of October, throughout November and the greater part of December.

In respect to the cutter and sleigh painting, if these vehicles do not come to the painter, then the painter should come to them. The sleigh owner is almost invariably slow in moving his equipment to the paint shop. Naturally he desires to feel the chill of winter in the air and see "a tolerable run of sleighing" before seeking the painter. Then in



A HANDSOME SPECIMEN OF ORNAMENTAL IRON WORK.

profitless hours, which in the snow belt of country can be remedied to a large extent. The season of sleigh painting, as seasons go, is not overflowing with the milk and honey of enormous profits, but it offers, if wisely used, substantial remuneration for the outlay of labor and material. THE AMERICAN BLACKSMITH in previous issues has clearly pointed out the necessity of uniting business talent with mechanical skill in the management of the carriage paint shop, and this rule applies no less forcibly to the smallest shop visited by the BLACKSMITH than it does to the

a state of great impatience he invokes that personage's aid in getting the cutter or sleigh into the whirl of public gaiety. In view of which it is the first duty of the painter to get the sleighs in early. You may depend upon enough belated trade to keep the shop busy at the latter end of the season. Get in the equipment early and keep it moving. As a rule, the earliest run of cutter and sleigh work yields the largest profits. This present season should be an exceptionally profitable one for the painter located within the sleigh-using zone. Wonderfully favorable

shop and trade conditions are everywhere present. Money is plenty, the confidence of the business world is at a high tide, and the people who use the sleigh equipment in this country are amply prepared to keep the painter busy, if hustling business methods are employed to bring about that result. As compared to prices paid for carriage work, sleigh painting rates are low, but compared to the required processes of carriage work the processes of sleigh work are easy and much more quickly carried forward. While the public is more critical now than formerly in respect to sleigh surfaces, there is the important and unsurmountable advantage of having the surfaces below and inconveniently out of line of the public eye. Less expensive varnishes suffice for sleigh work. Many colors which would otherwise remain unused upon the paint shop shelves may be worked over and tricked out with charming results upon the sleigh equipment.

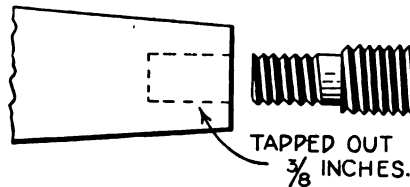
When the cutter or sleigh is to be simply touched up and revarnished, but little unhangings should be done. Remove the shafts. With a soft sponge wet and dipped into No. 00 pumice stone go over the body surface just enough to remove the dirt motes, greasy accumulations, etc. Then wash up, and match the color, touching up sparingly. At best, touching up with match color is a difficult work, and the least touching up possible is always the best. If a coat of color, re-striping, and one coat of varnish is desired, sand over with No. 1 sand paper, dust off, and lay the color to dry flat. Stripe in due time and apply a heavy bodied, hard-drying, finishing varnish. In case the job is to be surfaced upon roughstuff the processes which govern in carriage work will apply, only less coats will be sufficient. The style in colors and striping embrace, for colors, popular reds, yellows, greens and varying combinations of these colors, and for striping, single and double line effects, with simple, but nicely wrought out, corner pieces. These colors apply particularly to cutters and light speeding sleighs. Deep, rich reds and light tints of yellow, striped with aluminum or gold, are notably popular for the lighter style cutter. The big, luxurious old comfort cutter, and its various relatives, along with two-seated pleasure sleighs, rule fashionable painted in the three shades of ultramarine blue, in the dark, handsome greens, popular on cabriolets, broughams and landous, and in maroon. Moldings are painted black, and the

striping is selected to harmonize perfectly with the panel colors, the single line striping, with a dainty, cut up corner piece being preferred.

Repairing the Broken Thread End of an Axle.

J. F. COLLICOTTE.

I will endeavor to give you an idea of a piece of work I did the other day, which I never saw done before. A customer came to my shop with the



REPAIRING AN AXLE THREAD END.

thread end broken off of his buggy axle. I took an old axle and cut off the thread end a little above the threads, drew that end down to $\frac{3}{8}$ inch and cut threads on it, as shown. Then I drill a hole in the end of the broken axle, tap it out, screw in the piece, braze, and have a solid job.

A Rough-and-Ready Remedy for Worn Axles.

B. C. JOHNSON.

I have a great many wagons and carriages to handle, the axles of which are so worn that the vehicle sways greatly when running. I have a quick way of repairing which makes them run true for a long time.

First I raise the axle with a wheel-jack, and before removing the wheel shake it to get an idea as to how much metal it will take to fill the worn box. After removing the wheel, I wipe out the oil and grease from the box, and take the wheel to the anvil. Taking a piece of iron or steel, I draw it out about $\frac{7}{8}$ inch wide and thick enough so that when driven in the box, the wheel will fit tight on the axle. In other words it is simply a $\frac{7}{8}$ -inch band driven into the box to fill out the worn places. Steel will wear longer than iron, but is a trifle harder to shape. The ends must be filed square to prevent them slipping by each other. The thickness of the band depends of course upon the amount of wear. As a rule, the wheel will not quite go on, so that I file the spindle up next to the shoulder on each side. If you do a good job, there will be no wobble to the wheel and it will run smooth and tight, unless there is much wear at the front end of the axle.

The bands I use are mostly $\frac{7}{8}$ by $\frac{1}{8}$

inch thick. I have put in a number of sets of bands at one dollar per set, and many customers say they like them better than cutting off the axles.

How to Install a Gas Engine.

BILLY BUNTZ.

When putting in a gas engine, the first question for the smith to ask himself is, "About how much power do I require?" and in answering it, he should figure not only on the amount which will be necessary to meet his present requirements, but he should add a little for surplus, and get an engine big enough so he may hitch on another machine or two in the future, especially if there be any likelihood at all of this ever becoming necessary. Anyway, it is best not to figure too close. A surplus of a half or a full horse-power is a good thing, as an engine which is a little large will run the machines faster and easier, and there will be no danger of straining it. The reason some gas engines give trouble is because they are required to pull too heavy a load, and therefore after a time become as an overworked horse, and only "hobble along." It seems to be the nature of man to expect a little more of everything than he is likely to receive.

In a shop which has a full complement of small machines, hammer, drill press, lathe, emery wheel, polisher, blower, saws, etc., it may be that only two or three of these at most are to be worked at constantly, the other machines being switched out or allowed to run light, in which case only about half the power will be required as were several men to work at them continually, as in a machine shop or factory. In operating the above number of machines for a couple of men, a $2\frac{1}{2}$ or 3-horsepower engine should be used, while if three or four men are to work at them at one time the engine ought to be of 4 or 5 horse power. It is really surprising the number of machines a 3-horsepower engine is capable of pulling. A one or $1\frac{1}{2}$ -horsepower gas engine will pull a small blower and an emery, but if other machines are to be added it is better to have a larger engine. Many of the gas engines have valves for regulating the supply of gasoline, so that the consumption of oil is in proportion to the pull, as, for instance, a 3-horsepower engine when pulling only one horse-power can be adjusted so that the consumption of gasoline would be the same as though it were a one-horsepower engine, and at the same time the additional power is there to be used when needed.

The exhaust from the cylinder is usually muffled by a "silencer" of some kind, such as a pipe provided with a bell-shaped cap. Some smiths run the exhaust pipe outdoors into a little hole in the ground which entirely muffles the sound.

Gas engines in the small sizes are mounted usually on skids, which have holes for bolting the engine to the floor or to a box. An excellent foundation is made of masonry, which is inexpensive and holds the engine firmly, preventing shaking or jumping. A heavy, flat rock is just the thing. Where a cast-iron base is desired it can be ordered with the engine. By putting in a small box-partition to act as an engine-room, the engine may be kept free from dust.

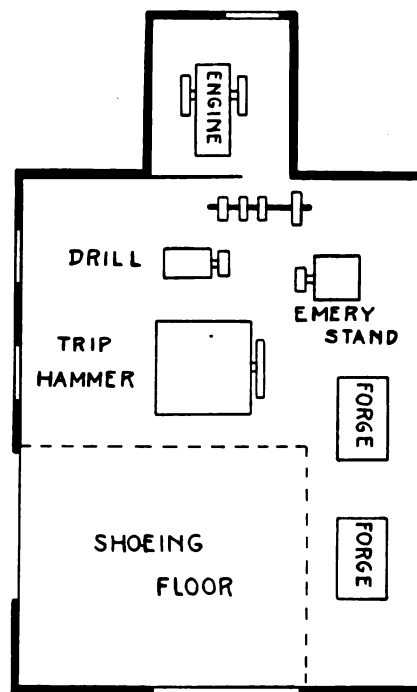
It may be well to say right here, that while a gas engine requires little attention, it should be kept as clean as possible by wiping, and the bearings kept well lubricated. Gasoline of the best quality is the cheapest in rendering good service, that is, what is called

machines. A shaft of about $1\frac{1}{8}$ or $1\frac{1}{2}$ inches in diameter is generally used, the same being held by a sufficient number of hangers to make it firm and prevent wobbling or bending. As the shaft is short or usually not over 30 feet in length, sometimes only 10 feet, from two to six hangers are sufficient, as one is not needed at every pulley. The speed of the shaft may be from 125 to 200 revolutions per minute, although 150 revolutions is amply fast. Wood-working machines require the higher speed, while machine tools are run more slowly. Generally speaking, emery wheels should run at a peripheral velocity of about 5,500 feet per minute; grind-stones, from 600 to 900; polishing wheels, 7,000, while a surface speed of from 20 to 25 feet per minute is a fair average for lathe, planer or shaper. When the exact speed at which a machine should run to give best results is not known, it had best be obtained from the manufacturer, as well as the size of pulley commonly used, if the machines are being changed from hand to

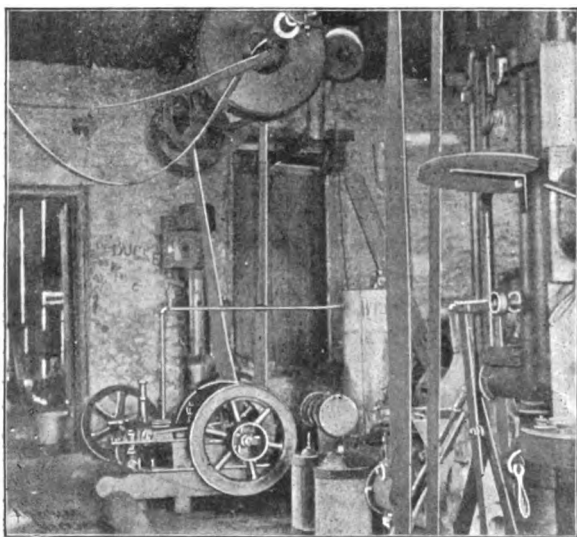
power feed. As a rule, machines are fitted with pulleys of proper diameter for speeding them when shipped from the factory, and it is only necessary to figure pulleys for driving them off the line shaft, which is an easy matter when the speed of the shaft is known. Multiply the diameter of the pulley on a certain machine by its number of revolutions per minute, and divide the product by the speed of the line shaft in revolutions per minute, which will give the diameter of a shaft

pulley for driving the machine. Should the machine be without pulley, multiply the diameter of main pulley on the line shaft by the number of revolutions of the shaft, and divide the product by the number of revolutions the machine should run, which will give diameter of pulley for the machine, with a pulley on the line shaft of the same size as the main pulley. The main pulley for the shaft may be figured by multiplying the diameter of driving pulley on the engine by its number of revolutions per minute, and dividing the product by any amount between 125 and 200, according to the speed desired on the shaft. Some smiths use extra heavy pulleys, web

pulleys, or balance wheels on their machines to steady the motion. (Saws are usually provided with a balance wheel.) A shaft of small diameter is more speedy than a heavy one, but of course



SHOP OF W. E. GRUBER, OUTLINE PLAN.



INTERIOR VIEW—SHOP OF ROBERT KINGHAM.

"74 degree gasoline." Sometimes gasoline contains a little dirt or straw, and as these would choke the feed pipe, necessitating shutting the engine down to take the pipe off for cleaning, it is best to strain the gasoline through a piece of silk cloth when filling the tank.

In connecting up, the engine should be set in a convenient location, usually in the far corner, leaving the front of the shop for floor work. The line shaft may be placed overhead and the machines belted up at an angle of say 45 degrees, or, where the machines can be placed in a row, it may be put under them, which takes less belting and leaves a clear space around the

the smaller the diameter the stronger should the material be. Likewise, a wide, thick belt will transmit more power than a thin, narrow one. However, though this be so, it does not imply that a shaft only 1 inch in diameter or pulleys of wide face or 3-ply belt of extra width should be used merely to run a few small machines, but that a little judgment should be exercised so as to figure an outfit of the best kind in accordance with common practice. The faster a belt runs, the smaller it need be to transmit a given amount of power. Ordinarily, a $1\frac{1}{8}$ -inch shaft, a pulley of 5 or 6-inch face and a single belt 3 or 4 inches in width answer very well.

On account of the line shaft being of only one speed and required to run some machines very slow and others exceedingly fast, it necessarily follows that a pulley sometimes figures out a diameter so small as to be insignificant, or so large that its weight would sag the shaft or its cost empty a man's pocket. In such cases a speed-jack or countershaft should be used to change the speed.

If a machine is to be run very fast, use a fair-sized pulley on the line shaft so as to run the countershaft two or three times as fast, and then multiply the diameter of pulley on machine by its number of revolutions and divide by

the speed of the countershaft to get a pulley of proper diameter on the countershaft for driving the machine.

Lathes, drills, etc., are usually furnished with small countershafts by the manufacturer, the same having cone pulleys so as to run these machines at different speeds. The best countershafts are provided with clutch pulleys and a shipper for throwing the drive pulley in and out of power.

The more the machines are scattered the greater the number of countershafts needed, although some of them may be avoided by setting the machines in the most convenient location for belting to main shaft.

Decide on what machines you are to put in or run, where they should set for convenience in working at them, and you will readily know how long your main shaft should be and where countershaft should be placed for running the machines which are scattered. Then figure pulleys for the shaft, put in speed-jacks where necessary, and place your order.

In order to give a practical illustration of the installation of power in smith shops, we will consider a few cases in detail.

Mr. Robert Kingham, Winfield, Kansas, runs a repair shop, making a

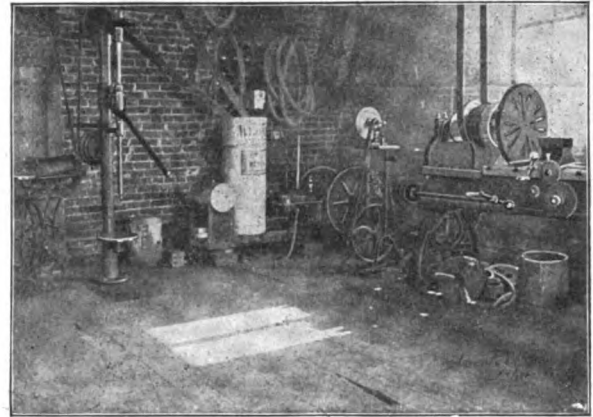
shaft, both belting to 12-inch pulleys on the lathe countershaft. The wood lathe is driven by a 36-inch wheel on the line shaft. On the other side of the shop is a double emery wheel stand, and a 24-inch shaper. A 26-inch drill press in the middle of the room is driven by a 14-inch pulley on the line shaft. The line shaft itself runs down the center of the shop, an 18-inch pulley on it belting to an 8-inch pulley on the engine. The latter runs at 375 revolutions per minute, giving a speed of 167 turns to the line shaft. The engine, as shown by the accompanying engraving, is mounted on a skid foundation which is bolted to the floor. It develops three actual horse-power.

Mr. W. E. Gruber, White City, Kansas, running a general blacksmith shop, has a 2½-horsepower Weber gasoline engine, driving an emery grinder and polishing wheel, a Little Boss trip hammer and a Champion Drill Press. He states that it pulls all the machines together and that a 13-year old boy gives it the necessary attention. The engine sits in a dust-proof room, 10 by 8 feet. The engine driving pulley is 8 inches in diameter, and runs at 375 revolutions. The 8-foot line shaft, 1⅞ inches in diameter, has a 12-inch pulley belted to the engine. The emery wheel, drill press and trip hammer are driven by 26, 10 and 12-inch pulleys on this line shaft. The general plan of the shop is shown by the accompanying figure.

Mr. A. A. Schaeffer, Tarkio, Mo., has a blacksmith shop, 16 by 42 feet. Along the short side furthest from the door runs a 1½-inch line shaft, driven by a 11-inch pulley at one end of the shaft, belted to the 8-inch pulley of a 3-horse power gasoline engine, the latter running at 375 turns. A 14-inch line shaft pulley drives a 6½-inch pulley on the drill. A 3½-inch wheel belts to a 12-inch wheel on the disc sharpener, and a 24-inch pulley, with a 3½-inch one on emery wheel, drives the latter at 1800 revolutions. The engine and machines sit in a line across the short way of the shop, being belted up to the line shaft at an angle of 45 degrees. This arrangement leaves the front half of the shop clear for the forges, tire shrinker and shoeing floor.

Mr. P. P. Belt, Fredonia, Kansas,

has a 3-horsepower gas engine driving a 25-inch engine lathe, 13-inch foot lathe, 20-inch upright drill, 24-inch planer, 12-inch emery grinder, blower, etc. The gas meter registers only about 150 cubic feet per day, which,



SHOP OF P. P. BELT, SHOWING LOCATION OF ENGINE.

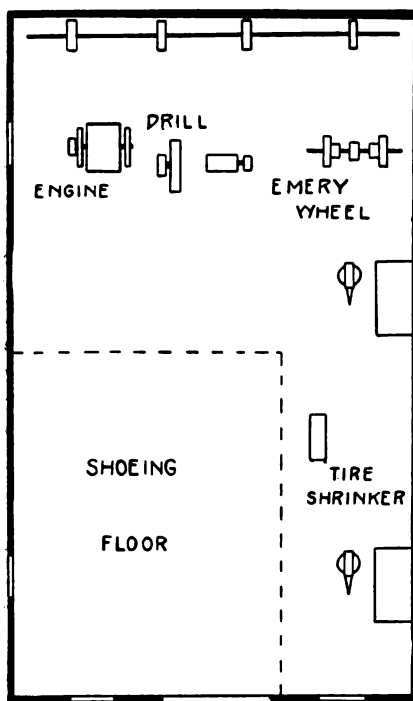
with natural gas costing but 25 cents per thousand, gives a fuel cost of about three cents per day. The engine in this shop is placed in one corner and belted up at 45 degrees to the line shaft running down the center of the room and revolving at 150 revolutions per minute. The two lathes are placed along one side of the room, with the planer and emery grinder on the other, the drill standing directly under one end of the line shaft. The accompanying engraving shows one corner of this shop.

Estimating Costs in Carriage Shops.—3.

BY D. W. M.

A really fine vehicle can be produced by building in quantities at about half the cost of the usual retail method. The difficulty is not in the manufacture but in the marketing of really fine articles. The customers who buy anything fine are isolated, making the cost of finding and convincing them so great that it is seldom profitable to build such work in large quantities. For this reason the small shop still has a chance. A favorable acquaintance in the community will bring a certain amount of trade wanting a really fine article.

If the manufacturer is possessed of correct ideas and abilities, he may make the working drawings for the vehicle he is to build. If he has a wood shop and a good body maker, he may make the body and wood parts, but he must not neglect to count in the making of the draft as part of the cost. If, however, he has not a good body maker, and



PLAN OF SHOP OF A. A. SCHAEFFER.

specialty of boiler and engine repairing. His shop is 30 by 20 feet. On one side are two lathes, one a 25-inch engine lathe and the other a 14-inch wood lathe. The former is driven by a 12-inch or 18-inch pulley on the main

thoroughly seasoned timber, he had better get some good body shop to build the body. Good body shops are scarce, but they exist.

He may also buy his gear, wood parts, shafts and wheels. Prices vary greatly according to quality. Some consider forest timber good enough. A fine vehicle, however, should have the following: Black hickory axle caps and head block; second growth hickory reach and spring bars; black hickory rims, second growth spokes, and elm or green hubs in the wheels. A good "B" wheel, made by a reliable house, is generally good enough.

The object of this article is to show how a small builder should proceed to make an estimate of cost. We will therefore suppose a shop with a wood-working department adapted for repairing, as most small shops are. The blacksmith shop is the main feature. The proprietor is a smith by trade and sometimes works at it when busy. He hires his wood-worker and painter. He does no trimming, but buys the trimmings already made. He has a paint shop, but farms out the work to the painter. We will suppose he has an order for a delivery wagon from a dry goods store of his town. After making a sketch of the design, he marks out the dimensions of all the parts and makes an estimate of the number of bolts he must use, and their sizes—the screws, Norway iron, charcoal iron, steel, clips, fifth wheel and other forgings; malleables, etc. He sends his sketch to a body shop for a figure on its cost. He writes to a wheel factory or to his jobber for price on the wheels, and to his jobber most likely for prices on all the other items. He may buy everything from his jobber because his credit is good there, and he can be more promptly served than by some factory which cares but little for such semi-occasional customers. He may even be able to buy cheaper from his jobber for the same reason. Having gotten his prices on material, he is in position to draw up a schedule and proceed to make an estimate which he can file away for future use.

I would suggest the following formula because it gives the estimate of cost on such parts as may be separated and applied to the estimating on other vehicles. Inasmuch as many small shops have workmen who can build bodies, I also give the schedule for the same, but if bought from a body shop one must add freight and drayage, also design and drafting cost.

It is a good plan to make a memorandum on every invoice bill of the amount paid on freight and drayage on those items, so that in looking up the bills the cost delivered at the factory will be shown.

Under the head of labor one will simplify cost estimating by having as much as possible done by piece work. There will often be drilling done by men or boys who work by the day and this must be added. The piece worker wishes to have his work delivered to him, which is an extra cost. I include these under the items, "machinework" and "portering"—including also any other outside work appropriate under those heads.

It is well to have the lists of bolts, screws and other items used in a body, gear, or other parts, kept separately and handy for reference, and revised as needed, either for quantities or prices. It is customary to include priming as one of the items of cost of all wood work, as something done outside of the work of a piece, or contract price of painting. But I have not included it in this schedule, because in a small shop the painter does the priming as part of his work and takes the job in hand as soon as it is ready. I am supposing a shop in which nothing is built except on order. My object is not to show how cheap a wagon can be built, but the plan on which to estimate the cost. The item under "Foreman" may include the proprietor's time, if he has no foreman, given to superintending the work. But if he performs any of the actual work it should be counted as labor under its proper head.

Delivery Wagon Cost Table.

BODY.		GEAR.	
Lumber—		Gear woods.....	\$ 0.40
Ash.....	2.50	Machine work.....	.40
Poplar.....	4.20	Bench work.....	.50
Pine.....	1.00	Axles.....	4.00
Bolts, screws, nails.....	.70	Springs.....	4.50
Glue.....	.15	Fifth wheel.....	1.00
Screws.....	.12	Clips, axle, spring	
Hinges.....	.90	etc.....	1.20
Lock.....	.20	Shaft shackles.....	.60
Wrought iron, including labor,		Bolts.....	.50
\$3.00—		Iron.....	2.50
Rocker plates.....	4.00	Coal, etc.....	.50
Post irons.....	1.50	Forgings bought.....	.80
Braces, etc.....	1.00	Malleables.....	.20
Malleables.....	1.20	Labor by contract.....	6.00
		Labor extra.....	1.50
		Portering.....	.50
		Foreman.....	2.00
Machine work.....	.80	Total for gear.....	\$27.10
Bench work.....	2.00	Wheels in wood.....	\$ 8.00
Design.....	5.00	Tire, bolts, clips.....	8.00
Draft.....	5.00	Coal, etc.....	.20
Portering.....	1.50	Labor—	
Foreman.....	5.00	Bend'g, tiring,	
Total cost, body in		bolting, drill-	
white.....	\$36.17	ing tire.....	1.20
Irons for body—		Portering.....	.40
Wrought.....	\$ 8.00	Boxing.....	.20
Malleable.....	.50	Banding (if wood	
Iron (raw material).....	1.20	hubs).....	.50
Bolts, screws.....	1.00	Cost of wheels.....	\$13.50
Coal, etc.....	.25	Total cost, gear in	
Smith labor.....	4.00	white.....	\$40.60
Other labor.....	1.00	Paints and var-	
Portering.....	.50	nishes for body.....	4.00
		Brushes, etc.....	.50
Total cost, body			
ironed in white.....	\$52.62		

Labor, painter.....	\$10.00	Additional labor.....	\$ 0.50
Portering and		Portering, etc.....	.20
other assistance	1.50	Total cost of shafts	
Lettering.....	8.00	(ironing).....	\$ 4.10
Total cost painting		In white, ironed.....	\$ 6.50
body.....	\$18.00	Total cost gear	
Trimming goods.....	1.00	and shaft in	
Covering roof.....	.80	white, ironed.....	\$47.10
Cushion.....	4.00	Paints and var-	
Carpet.....	1.00	nishes for gear,	
Apron.....	1.00	brushes, etc.....	2.00
Leathers.....	.50	Labor painting	
Labor.....	.40	gear.....	4.00
Total trimming.....	\$ 8.70	Cost of painting	
Hanging off bolts,		gear.....	\$ 6.00
etc.....	1.00	Paints and brushes	
Glass, bev. Fr. pl.....	12.00	for shafts.....	\$ 0.60
Lamps and irons.....	10.00	Labor painting	
Handles, plated		shafts.....	.50
rails, etc.....	8.00	Cost of painting	
Whip socket.....	.80	shafts.....	\$ 1.10
Touching up ma-		Total cost of shafts	
terial.....	.20	painted.....	\$ 7.90
Shaft rubbers, etc.	.20	Shaft leathers.....	\$ 1.50
Labor, hanging off	2.00	Tacks, screws, etc.	.10
Labor, touching up	.40	Plated tips.....	.50
Labor, getting		Pl'td hold-backs.....	.50
ready to run.....	.40	Labor, trimmer.....	.75
Cost mounting.....	\$30.00	Cost of trimming	
Shaft woods.....	1.00	and mounting	
Labor on same.....	.80	shafts.....	\$ 2.85
Malleables.....	.40	Total cost gear and	
Screws.....	.10	shafts.....	\$57.05
Portering, etc.....	.10	Total cost body.....	\$109.32
Cost of shafts in		Total cost job.....	\$166.37
wood.....	\$ 2.40		
Iron for shafts.....	1.20		
Malleables.....	.10		
Bolts.....	.40		
Screws.....	.10		
Coal, etc.....	.10		
Smith work.....	1.50		

I have added an item for freight and drayage at the end of the list, to include any items not accounted for in estimating costs of material. If not already included in the invoices as suggested above, the totals for freight and drayage may be inserted here. A separate enumeration of trimming goods should be kept, such as the cost of cushion, carpets, apron, etc. I have separated the cost of painting the body from the gear and shafts. Usually the contract price includes the whole vehicle. But for purposes of convenience in figuring costs, it is preferable to have a separate figure on the items as indicated. In a small shop the cost of ironing will include, ordinarily, the whole job, but I have separated the cost of ironing the body, gear, wheels and shafts for convenience in future reference for making estimates. I have not mentioned dash, because that is supposed to be of wood and part of the body.

In repair work, every job must be estimated separately with liberal allowances for unknown quantities, for they are sure to turn up. The items of taking in a repair job, estimating on it, cleaning it up preparatory to putting in the shop, taking it apart and other merely preparatory steps, together with assembling the parts when the work is done and overhauling the little things are matters which can hardly be charged for by item, but must be included in the estimate of cost. Many

include it under "general overhauling and tightening up."

Total cost gear.....	\$ 46.80	
Total cost shaft.....	10.45	\$166.37 - 53.44 %.
Total cost body.....	100.82	
Gen'l exp. { Fr't drayage, etc. }	10.00	- 8 1/2 %.
{ Wear and tear }	10.00	- 8 1/2 %.
Rent, ins., interest on capital.....	10.00	- 8 1/2 %.
Taxes, office exp., com., etc.....	10.00	- 8 1/2 %.
Selling expenses.....	25.00	- 8 1/2 %.
Total cost.....	\$221.37	
Profit.....	78.63	- 26.48 %.
Selling price.....	\$300.00	
Merchandise { not including }		
total { gen'l exp. as }	\$102.53	- 84.15 %.
above (\$10.00). }		
Labor total.....	\$77.85	- 25.88 %.
General expenses, etc.....	\$55.00	- 18 1/2 %.

When the work is actually done, the necessary corrections can be made in the estimate to keep for subsequent use. At the end of any period, one month, three months, six months, or a year, correct accounts having been kept, the total amount expended for merchandise ought to bear a close percentage relation to that indicated by the cost estimates, so also the amount expended for labor and other departments. If not, then something is wrong and needs revising. We will suppose the following to be the report of the business for three months:

Amount charged for new work.....	\$2,100.00
Amount of repairs.....	4,500.00
Total sales.....	\$6,600.00
Number of new jobs.....	77.00
Average value of new jobs.....	300.00
Total wages (outside of office).....	\$1,980.00 = 30% of sales
Total for merchandise.....	1,650.00 = 25% " "
Total cost of office and general expenses.....	900.00 = 15% " "

The discrepancy between the percentages of the estimate and those of the report may be due to conditions in the repair work, where the labor exceeds the value of the material. Hence it would be advisable, if possible, to keep the repair accounts separately, as some shops do, only certain hands working on repairs and others on new work, and the two sets of men being run as two shops, as far as the accounts show. In that way the facts may be arrived at and proved up.

The cost of general expense, etc., in the report appears to be less than in the estimate, hence that can be corrected, but as the next three months may show an increase, it is best to get the results of a year's work before cutting down estimates on general expenses.

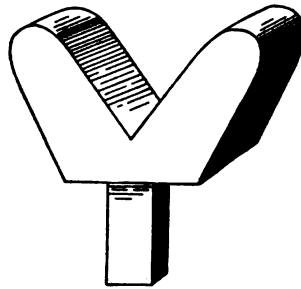
It is only by continual revising and proving up by the best means practicable that anything even approaching certainty can be arrived at in a repair shop, and if an error in figures is to be made, let it be always in favor of the house and not of the customer.

If all data bearing on the subject of costs be carefully preserved for reference, the immense advantage of such a system will quickly make itself felt.

A Tool for Working Up Bolt Heads.

WILLIAM P. DAVIS.

I have a useful tool for working bolt heads that are welded on. I take a piece of steel about 2 1/4 inches square, and fit one end into the square hole of the anvil. The top I split as shown in



A USEFUL BOLT HEAD TOOL.

the illustration, to receive a one-inch rod. Then as you weld the bolt head on the anvil you can lay it in this tool to smooth up the end, then back on the anvil to square the head, then in the tool to chamfer the corners.

The Elements of Blacksmithing.—11.

JOHN L. BACON.

Instructor in Forging, Lewis Institute, Chicago. Tempering Springs, Milling Cutters, Etc.

Spring tempering when done in oil on a small scale serves as a good example of work where the temperature of the reheating is determined independently of the "temper colors." This method of tempering springs is known as "blazing," and gives about as reliable results as any on a small scale for ordinary work. The spring is heated to a hardening heat and cooled in oil. To draw the temper, the spring, still wet with the oil, is reheated until the oil commences to blaze up and then plunged into and immediately taken out of the oil bath and again reheated until it blazes. This is continued until the oil blazes uniformly over the entire spring at the same time.

Springs are generally not uniform in thickness, the thin parts heating more quickly than the thicker, and this momentary plunge into the oil cools thin parts somewhat, while it affects the thicker parts very little. As the reheating is continued, all parts of the spring are thus at last brought to the same temperature at the same time. If the reheating were continued without this partial cooling, by the time the thicker parts were hot enough to have the proper temper, the thin parts would be heated to too high a temperature, and have no temper left. Springs of course

must be very tough and not so very hard; for this reason they are hardened in oil, as the oil extracts the heat much slower than the water. The steel is consequently left tougher, and not so hard as if hardened in the ordinary way.

Animal oil and *not* mineral oil should be used for this kind of work, as the mineral oil is too uncertain in its composition and will sometimes blaze at one temperature, sometimes at another—while the animal oil is fairly uniform in composition, and generally blazes at about the same temperature. Lard oil is a good material for this kind of work.

Another way of tempering springs, which is rather risky, but which is sometimes used, is to harden the spring in the ordinary way in water. It is then reheated over the fire, and to test the temperature, from time to time, a dry, fine splinter is scraped over the edge of the spring, and as soon as the minute shavings thus made will catch fire, the right temperature is supposed to be reached. The burning of the wood in this case takes the place of the burning oil mentioned above. Sometimes, when no fine splinters are convenient, even the hammer-handle is made to serve the purpose. This is not a process to be recommended, but is merely given to show how the proper temperature to which to reheat to give the desired temper may be determined in a variety of ways, viz.—by the blue color of the scale, by the blazing of the oil, by the burning of the wood.

In all hardening, the greatest care must be taken to have the steel heated to a uniform temperature throughout. The metal should not be left in the fire one instant longer than is required to accomplish this, but, if good results are wanted, it must be uniformly heated. Care must also be taken in dipping—so as to cool as nearly as possible, uniformly. An object can be warped all out of shape by dipping improperly. The minute the metal strikes the water, it starts to cool and contract—and unless this contraction takes place on all sides of the piece at the same time, the side which cools first is apt to pull the others out of shape.

Suppose we have a piece of steel like Fig. 97 to harden, and dip it edge first into the water, that is, let it strike the water in just the position in which it is shown here. The lower edge will of course be cooled first and start to contract, while the upper edge is still hot. When the upper edge strikes the water, the lower edge will be somewhat cooled and consequently set; as the thicker

part cools, the whole blade will be sprung out of shape. As a general rule, it is always best to dip pieces of this shape, end first into the cooling bath. In this way the steel is cooled more evenly; and contraction starts from all sides at the same time; warping being thus more easily avoided.

The hardening of files is a good example of this sort of work, and the

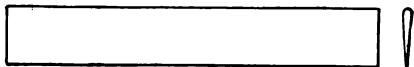


FIG. 97. SPECIMEN PIECE FOR HARDENING.

method employed may be used to advantage for many other long, thin, shapes. The files are heated in a pot of red hot lead having charcoal sprinkled over the top. The charcoal is to prevent oxidation of the lead. The files are placed in this pot on end, and as soon as properly heated, are plunged end first, being held almost straight up and down, into a vat of brine. Brine conducts the heat from the steel faster than water, and therefore leaves the files harder than if hardened in water.

The files nearly always warp slightly when hardened, and when the warping is slight are straightened as follows: Across the top of the brine vat are fastened two wooden strips, about two inches apart, and joined by two iron pins about six inches from each other. The hardener draws his file from the brine before it is entirely cold, the metal having just heat enough left to cause the water on the surface of the steel to disappear almost instantly. The file is then placed under one pin and over the other with the concave side up. Fig. 98 illustrates the method employed. The hardener then bears down on the end of the file, springing it straight, and at the same time pours some of the cold brine on top of the concave part.



FIG. 98. METHOD OF STRAIGHTENING WARPED PIECES.

This will generally straighten out the file, and leave it perfectly true. Of course, if the files are too badly warped there is nothing to do but reheat, straighten, and harden again.

There is a belief among some people that files are burned in the making, and consequently that the steel in old files is worthless. Such is not the case, as a file made from burned steel, or even

overheated in the hardening, would be absolutely worthless.

The best practice for all-around hardening is to heat in a gas furnace, where an even heat can be maintained and a pyrometer is used to determine the proper heat. Small shops cannot always have this apparatus, and one of the best substitutes is to heat in red hot lead as described above. For small work, an ordinary ladle will sometimes do to heat the lead in. One advantage of the lead is the fact, that steel being so much lighter will float on the surface of the melted lead, and may be easily watched as the heating proceeds.

When milling cutters and such things have to be heated in an open fire, it is a good plan to lay a thin piece of sheet iron in the fire; the cutters may then be easily moved about, and do not come in direct contact with the fire, insuring more even heating. Cutters, taps, dies, etc., are ordinarily hardened when made on a small scale, as follows: The cutter, or other tool, is first heated to the hardening heat, and hardened by cooling "stone cold" in water. (It should be kept in motion all the time it is in the water). It is then polished all over. To draw the temper, it is laid on a large piece of red hot metal, and turned frequently to avoid uneven heating, until the surface of the steel shows the color corresponding to the temper which it wished to give the tool. For ordinary milling cutters about a "dark straw," brownish yellow, is right. A good plan for heating taps, small end mills, etc., is to lay a piece of pipe through the fire, and heat the tools in this. This makes a sort of crude, muffle furnace, which is very satisfactory for many kinds of work.

Another method of tempering which the author has used for milling cutters and taps, and which has proved very satisfactory, is as follows: The tools are heated in the ordinary way, and cooled in water, but are not left in the water long enough to become completely cold,—being drawn out of the water as soon as the "singing" stops. (When red hot metal strikes water, the water in immediate contact with the metal starts to boil, and this boiling produces a decided humming, or singing noise, and a throbbing sensation easily felt through the tongs. This ceases when the outside of the metal cools to about the temperature of boiling water). When the tool is drawn out of the water, it is instantly plunged into lard oil, and left there for a very short time, depending upon the size of

the tool, and then withdrawn. It is then held in the flame of the forge, or near the fire, until the oil on the outside just commences to smoke—when it is again plunged for an instant into the oil and again reheated, this being continued until the oil smokes evenly all over the tool, when the tempering is complete, and the tool may be cooled off. The object of this method is this: The first cooling in water hardens the outside and cutting edges of the tool, and the tool is then taken out of the water and plunged into oil while the inside is still comparatively hot. As the oil conducts the heat more slowly than water, the cooling of the tool is continued in the oil, thus leaving the center rather tougher than if hardened in water. But even here the metal is not completely cooled, as it should be taken from the oil bath while there is still some heat left in the center. This heat in the center will help draw the temper of the outside, and consequently the tool can be reheated much quicker



FIG. 99. A DIFFICULT SHAPE FOR HARDENING.

than if entirely cooled. The smoking oil merely serves to indicate the temperature to which we are reheating. With a little practice the tool can be withdrawn from the oil bath while there is still heat enough left in the central part to draw the temper. In this way, no reheating in the fire is necessary—the tool being simply taken from the oil, allowed to reheat itself until the oil commences to smoke, and then plunged in water to prevent further reheating.

The two great things in tempering are uniform heating and common sense. You *must* have a uniform heat or you can not harden satisfactorily.

There are some shapes which are very difficult to harden. Fig. 99 shows a sectional view of a steel bushing which should be very hard. The body of the bushing is thick and contains proportionately a large volume of metal, while the flange is very thin and light and joins the body in a sharp angle, making a bad shape to harden. The thin flange cools almost instantly when it hits the water, while the body takes some seconds to cool and by that time the flange is set. As the body contracts in cooling it pulls away from the flange

and is very apt to crack through the sharp corner. Of course a shape like this will not *always* crack, but there is always the tendency to do so when a thin body of metal joins a thicker in a sharp corner. This danger can be lessened by leaving a fillet in the corner as shown in the side sketch. This equalizes the strain somewhat by not leaving a distinct line between the thick and thin parts. Milling cutter teeth when made with a sharp angle at the bottom are liable to crack in hardening, but if left with a slight fillet between them very rarely crack when properly heated.

Self-hardening steel is steel which does not have to be hardened in the ordinary way. Tools made from this steel are forged into shape, and then allowed to cool in the air, or if wanted extremely hard, cooled in a cold blast of air. This steel can not be worked cold to any extent but has one great advantage. Tools made from it may be ground until the points are red hot and then put in a lathe and used as ordinary tools. They will also stand harder usage than if made from ordinary steel, and will work hard material to better advantage. In forging, however, very much more care is necessary as the steel must be worked at almost a constant temperature—a higher temperature will cause the metal to go to pieces, while if worked at too low a heat the steel will crack. The proper heat can only be learned by experience.

Self-hardening, or air-hardening steel as it is now more properly called, is sometimes known as Mushet steel, from the fact that Mushet made air-hardening steel when it first came into common use. There are other firms which now make air-hardening steel so that the name Mushet steel can not be properly applied to all such material, although Mushet steel is now used to a large extent.

Special steels have been produced in the last few years that promises to cause a revolution wherever machine tools are used to a large extent. These tool steels are of the air-hardening variety and are being constantly improved upon.

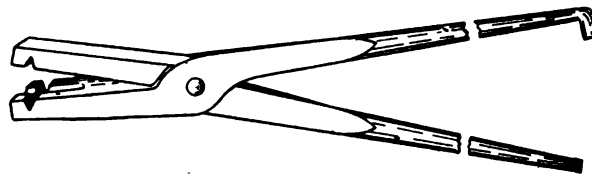
(To be continued.)

A Pair of Useful Combination Tongs.

J. P. MULRONY.

The tool shown on this page, I find of use as a pair of tongs, clip tie and bolt head holder, both at the fire and at the vise. The jaws have a half round swage crease sunk on the inside of each.

About $\frac{1}{8}$ inch from the outer end of each, I sink a transverse or cross crease suitable for receiving the edge of the head of a bolt. As it is deeper in the center than on either edge, it holds a short bolt firmly in the fire or in the vise when welding, cutting threads,



COMBINATION TONGS, CLIP TIE AND BOLT HEAD HOLDER.

taking off nuts, or running down nuts on plow bolts or carriage bolts. This is done without damage to the heads.

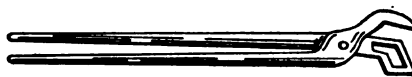
The ends of these tong handles are made, one hooked, the other flat, straight and fitting inside the hook of the other handle. This forms a clip tie.

Such tongs will be found a combination which will save a blacksmith many steps during a day's work looking for the tools which it combines. It will also hold flat and round iron.

Hints on Plow Laying.

WILLIAM L. GREEN.

Plow laying is a piece of work that requires no little amount of skill, and the percentage of blacksmiths that make a good fitting and good looking share is small. To put on a short bar or slip share, first strip the plow of the old share, then forge your bar to fit properly, so it will line up with land-side, but do not drill your holes. Take a small clamp and place on plow, so that you can fit your share. With regard to the share itself, as nearly all



USEFUL TONGS FOR PLOW WORK.

blacksmiths use the shapes as they are ground, you will have to make some changes in almost all of them, some by upsetting and some by setting down. After you have fitted your share properly, remove your clamps. Take the bar and share without drilling any holes and weld.

The figure shows a sketch of a pair of tongs for welding, having a slot in the lower jaw for the bar. A ring can be placed over the end while taking the first and second heat. They are certainly very handy for this work.

Place the bar and share in the tongs, heat with point up, then bend over and take a good heat. Another heat will bring you up to your tongs. Now

remove the tongs and take the final top heat. This is the time when you want to do your fitting. While it is good and hot, hold share and plow, and if your joint is open drive back on point of share, which will upset the bar and make a good joint. To clean your work, it

is good to hot rasp it. Now heat again, and shape it as you work back to the point. Be sure in so doing that you keep your bar straight. Now finish by working your point in shape, making a diamond point, which makes a nicer job. Some smiths do not like drilling the holes, as you cannot drill from the inside. Mark outside very closely, then with a wedge-shaped block of wood you can drill nicely. Now countersink the holes so that a new plow bolt head will come down even with the share. Always in making new shares, use new bolts; never use the old ones. Now square your holes and you will never have any trouble taking them out, when you want to sharpen. In the long bar plows, you should drill your holes before welding. There is more work on them than on the short bar, but not so hard to fit as a general rule. You will have to make a new bar out and out, if they are worn badly. You can weld on the front, and by laying a piece of steel on the head, they work all right.

When the bar is fitted, bolt on temporarily so as to fit your share to it when welding, start at point and weld up, then as you go back down you finish by shaping your point. The welding is an important part, and good fitting makes the welding an easy task. I will say in conclusion, that using the tongs mentioned for welding slip shares and drilling your holes often insures good fitting and better looking work than any other way. I have had a good deal of experience and find this to be the best for general shop use.

The Repair of Revolver Cylinders.

WILLIAM DUFF.

I will endeavor to explain how to repair a single action or solid frame double-action revolver cylinder, when the notches upon which the lever works in revolving it become worn. The simplest and best way of repairing them is as follows:

Take a piece of mild steel, the same diameter as the notched piece, drill into the cylinder $\frac{3}{8}$ to $\frac{1}{2}$ inch, and drive the

plug in tightly. If the plug is driven in while the cylinder is hot, it will fit more securely than if driven in when cold. Next take a drill the exact size of the old hole in the cylinder, fasten the latter in a vise, and from the front end of the cylinder drill a hole through the plug. Be sure to notch the cylinder the same as before, so that it will move $\frac{1}{8}$, $\frac{1}{4}$ or $\frac{1}{2}$ of a revolution around, for the corresponding number of shots. The number of notches must correspond to the number of chambers in the cylinder. If this is done properly the revolver will work as well as when new. A better way is to drill a hole through the plug, turn up a plug and fit it securely. Cut notches and set correctly, then drive in with a copper hammer. A lathe accomplishes the truest work.



Now begins a new volume.

Endeavor to get up a club this fall.

Repair before fall rains all leaky roofs.

Do you keep a record of the work in your shop? It is interesting to refer to.

We are waiting for you to tell us how we can make the paper better adapted to your needs.

How many blacksmiths in your town take the paper? Have you asked any why they did not?

If you get the highest prices charged for work in your vicinity, it is your shop that does it quickest and best.

The Trade Catalogues. Have you the latest ones on file? They're a good study for rainy days and evenings. A postal card will bring them.

Missouri State Normal School, at Cape Girardeau, expects to open up a manual training blacksmith department and will need an equipment for the same.

At Independence, Ky., the blacksmith shop of Eli Baker will be run by Mrs. Goodner. Do you know of any women smiths who do their day's work in the shop?

How about that letter on Gas Engines? Have you had any practical experience with them in the shop? If so, sit down and tell our readers what your opinion is.

What is the best advertisement for the village and country smith, or any shop for that matter? Isn't it the very highest class of work and a reasonable price for it?

Is there a tool in your shop which is constantly out of repair? Figure up how

much time is lost and see if it would not be best to discard it altogether and purchase a new one.

Many manufacturers now offer blacksmiths a trial of their machinery before paying. This fact shows a wholesome regard for the smith's opinion and a substantial faith in his honesty.

What will bring more work to your shop? Study the other smith's equipment, his way of doing things, the methods of the most successful shops in larger towns. Avoid what is poor. Adopt what is best.

When a bill comes for your subscription to a periodical, treat it as you would like to have customers treat your bills. Publishers are only human, and promises to pay or neglected bills are a scant diet.

Listen to the ideas of your apprentices. It encourages them. If they stumble on to a method of greater merit than the one you are following, do not let prejudice stand in the way of its being adopted.

Electricity is to be installed as power throughout the enlarged carriage and blacksmithing plant of Ortiz & Co., Albuquerque, N. M. This is progressiveness for you. The experiment will be an interesting one.

Give a dog a bad name and hang him. If you expect poor work from the apprentice, he will probably not disappoint you. The way to bring out the best there is in a man is to show that you have high confidence in his ability.

Gratification over a service rendered is pardonable. Mr. Henry Schmitt of West Bethany, N. Y., writes that he found his present place through an item in our December issue, and is very well satisfied with it. We are pleased in like measure.

Five hundred blacksmiths in various machine shops in Hudson County, New Jersey, struck for a 10-per cent. increase in wages, and several firms have partially suspended operations. The employers claim that the high price of coal makes a raise in the men's wages out of the question at present. The increase is deserved, the excuse invalid.

There is many a kink you practice daily which would help a brother smith, especially the younger generation, if described in these columns. Let us have it in your own language, with or without sketches. The editors will put it in shape for publication.

The twelfth census states there are 196 female blacksmiths in the United States. Send us the names and addresses of any you may know. We will present them with a year's subscription to THE AMERICAN BLACKSMITH. If the women are to invade our ranks, let's educate them.

A Handsome farrier. At a recent outing of the Master Horseshoers' Protective Association of Albany, N. Y., a year's subscription to THE AMERICAN BLACKSMITH was presented through the kindness of Mr. T. H. Sargent to the handsomest Master Blacksmith present, to be

decided by vote of the ladies. About twenty-five of the fifty-six present, considering themselves eligible, were drawn up in line after dinner and carefully scrutinized by the ladies. Everyone was well pleased with the decision, which declared President Thomas J. O'Brien the best looking by a good majority.

Blacksmiths are in demand. You can scarcely pick up a daily paper in a large city without noting advertisements for smiths of different classes. Employers are paying larger salaries and demand a higher standard of work than ever before. The men who obtain and hold these lucrative positions are of the up-to-date, energetic and thinking kind. They are eager for new ideas and methods of value. They do not think their ways of doing things incapable of improvement. They are always open to suggestions, and quick to adopt what they see is to their employers' interests.

Peter Tumble-down is the name of an interesting character often referred to in that excellent agricultural paper, the Farm Journal. Peter leaves his plows and machinery outdoors all winter, never repairs his fences and does all manner of shiftless things. The editor didn't say who shoes his horses. Probably he goes to the lowest priced blacksmith shop, doesn't know whether the work is done right or not, and finally doesn't pay his bills. He is a good customer for the back number smith.

In behalf of the apprentice. The blacksmith may be called the King of Mechanics, but is his attitude to the apprentice boy as favorable as the machinist or the engineer? Is there as much encouragement and as great an incentive to take up blacksmithing as other lines offer? Opinion seems to indicate otherwise. This should not be. The work may be made as attractive as other mechanical lines. The increase in the number of competent blacksmiths does not hold its own with the increase of mechanics in other lines, and we would like to see the necessary steps taken to bring about a change.

Eight muscular daughters have been trained by a sturdy smithy at Leeds, England, says the New Orleans Picayune, to assist him at his work. At present four are at work in his shop. The other four wielded the hammer for several years and then left the business to take up the duties of running homes of their own. Every one of these four daughters of the master smith are to be seen at the anvils following the trade of their father. They are up early and spend the working hours in making gas hooks—broad, bent nails which are used by plumbers for fastening gas pipes to walls. It is not such a hard task, yet the work requires great patience and enduring strength.

The heavy part of the work is performed by a machine worked with the foot. After the mechanical device has finished its labors the fair blacksmiths, with sleeves rolled up, put the finishing touches on the hooks with a hand hammer and get them ready for market. They toil on a piece-work basis, and the ingenious blacksmith calls each a "full hand."

Railroad Master Smiths' Annual Convention.

The Tenth Annual Convention of the National Railroad Master Blacksmiths' Association was held at Chicago, August 19-21, and was attended by the largest number of delegates in the history of the Association. According to the report of the Secretary, the affairs of the Association are in a most flourishing condition. During the past year a larger number of members enrolled than during any previous year, the total membership being 261.

As officers for the ensuing year, the election resulted as follows: John McNally, Chicago, president; Geo. Lindsay, Evansville, Ind., first vice-president; T. F. Keane, Helburn, N. Y., second vice-president; A. L. Woodworth, Lima, Ohio, secretary and treasurer; G. H. Williams, Boston, chemist.

As announced in our September issue, the balloting for next year's convention resulted by an overwhelming majority in the choice of Buffalo. Reports upon a number of very interesting subjects were presented to the convention and adopted by the Association. A few of these are reproduced in the following columns:

Report on Repairs to Locomotive Frames.

W. C. SCHOFIELD, FRANK PECK.

Locomotive frames are of so many kinds and sizes, and the conditions under which frames may be broken so different, that it makes the repairs so varied that it would be too tedious and altogether unnecessary to try to give any specific method of repairing each particular break.

The cost of removing, repairing and replacing a frame is considerable, and it should be our aim to carefully inspect every frame for other defects than that for which it was removed, so it can be repaired while in the smith shop.

Before repairing broken frames we should look into causes and try to find remedies if possible. If the break is from insufficient metal, put in new pieces, increasing the size where you wish it. If the break is from bad designing, you have a trouble that is ever with you, and often is impossible—it seems—to right; but each successive trial should suggest some new remedy until your efforts will be crowned with success. If from inferior workmanship, which is often the case, do it right. If from a wreck "cuss" the transportation department and fix the frame. Often we must make repairs as

Mr. So and So says, regardless of what we may know is best.

We think it of paramount importance to have a good smith to make a successful job of repairing a frame. We are satisfied that if at the feast of Solomon it had been a botch blacksmith, his head would have deservedly paid the penalty for his effrontery.

Often we have frames with small cracks to be repaired. This in our opinion can be easily and quickly done by cutting out to the depth of crack, and with a suitable tool backing up sufficient stock for a good heat. Make a V of proper size, take separate heats, weld and work smooth, and frame is ready to put up without any machine work. If properly done it will be a first class job. But we think splitting and inserting, in shop parlance a "dutchman," is bad practice, and should not be permitted. We think a V weld is the easiest and best method of making welds in repairing frames, if properly done, except in special places.

We think the V should be so made that fiber of iron will be in the same direction as the parts to be welded. You can make a job look as well by disregarding this, but it cannot be as permanent. In making V welds in heavier parts of a frame, the scarfs should, when put together, be not less than a right angle; the V should touch at the bottom first. We think it safe practice after the first V is welded on one side, instead of the next V being of sufficient size to fill, to use a smaller V and weld with pene of sledge or a fuller of suitable size; by doing this you are sure of a good weld in the center. Then put in piece of proper size to finish, and you will have a job that will be permanent. Now, it has occurred to most, or all, of you, that after your frame was machined you could plainly see where the two V's met, and sometimes more easily where the V's did not meet. Of course, if you have a suitable steam hammer this precaution will be unnecessary.

Steel frames are as yet not much in evidence; seems to be an expensive luxury that only a few roads can afford, and when you have them, make up your minds to repair them, for they are sure to come, and often in several pieces. We repair them the same as we do iron frames, and always use a V weld if possible; making the V of iron. Then we look every time the engine comes in to see if it is broken.

We have noticed where some of the craft, with the assistance of the round

house foreman, have found it unnecessary to remove broken frames to repair. This might be practical if we could pick the place for the frame to break. We have all seen the genius who welded the steel driving tire,—he didn't expect it to stand, but it was welded all right.

In conclusion, we think the manner of handling frames, and especially long frames where broken near center, has much to do with successful repairing. Where you have two cranes suitably located, it is an excellent way; when you have only one, you generally have to use most of the scrap iron on the place to counterbalance.

We think a good device is a bar of iron $1\frac{1}{2}$ by 7 inches, by 14 feet long, with a hole in the center for the hook of the chain block, tapered to the ends and a sheave on each end for the chain to roll over, and two chain wheels placed at proper distance from breaks in frame so as to balance. Thus your frame is easily handled and repaired; it is on the principle of the apparatus long in use for handling truck frames.

Report on Springs and Spring Making.

C. A. MILLER, C. D. MILLER, R. G. MILLER.

The subject of springs and spring making is one of the most important that comes before our convention to be considered and discussed. To make a first class spring, the quality of the steel is the main factor. The best is invariably the cheapest. The most skilled mechanic can have but indifferent success with a poor grade of steel. He can only get out of it the best there is in it. The life of a spring depends upon the quality of the steel and the manipulation it gets at the hands of the spring-maker. Any steel manufacturer will furnish any grade of steel your purchasing agent calls for, but as they sometimes look at the first cost, we do not always get the best. Be that as it may, the only thing for us to do is to give the steel in hand fair treatment. If we fail to do this our Company will save money by getting the cheapest article.

The heating and tempering are the most particular points about spring making. The spring-maker should be as conscientious in the treatment of his steel as the toolsmith. If by accident a leaf should get too high a heat, the proper place for it is in the scrap pile. It will do no harm there, but if allowed to go into the spring it condemns the whole spring, and will be a source of trouble and expense.

Some people have a preparation that they use in the bath that is a specific

for burned steel. "It not only brings it back to its normal condition, but makes it better." That is all a delusion. The cold water cure is as good as any patent medicine for burned steel, if dipped at the proper heat, but the best thing to do with burned steel is to throw it away. There are spring-makers that make a practice of plunging their steel in the bath at a white heat and drawing no temper, and still have no trouble with broken springs. Wonder if it is a fact? If so, the spring-maker should not be blamed. It is not his fault.

In the past thirty-five years I have had more or less experience with most makes and grades of spring steel. I have roasted the maker of some of it at times, but have used none of it that was not more or less sensitive to roasting. All grades of steel have a safe heat limit. To go beyond that means disintegration. This is as positive as the law of gravitation. It is very true that there is steel low enough in carbon to stand the white heat without any perceptible deterioration, but such steel is not fit to make springs of. Steel for springs should contain sufficient carbon to harden at a red heat. If sufficient hardness cannot be obtained with the oil bath at this heat, raise the specific gravity of the bath, but never the heat, until you get the desired result. Steel has a refining heat which can be readily found by experiment, and in heating it for the bath the nearer it approaches that heat the better.

The question of hardening steel is the time consumed in cooling. The bath that cools it the quickest hardens it the most. Anything added to oil or water only adds to or detracts from its density or specific gravity. Farther than that it has no power to make steel harder or softer, better or worse. Salt, owing to its specific gravity and purifying quality, adds to the density of water, removes all foreign substances, such as sulphur, etc., from the surface, and gives the bath free access to the steel. The same may be said of acid or anything of an acid or alkaline nature. They have no other virtue. For steel that contains sufficient carbon to harden in oil at the proper heat, this is the safest bath to use. It seems to have an affinity for steel and reduces the loss by cracking to a minimum. The oil should be kept at a low and even temperature by pumping it through cold water, changing the whole every five or ten minutes. A pump for this purpose can be constructed at a nominal figure, and

the same run by the air blast, virtually costing nothing for power. Turning the air blast into the oil bath for the purpose of keeping it cool is poor practice. It perhaps would be of some benefit in a dry atmosphere, but in a humid atmosphere too much water gets into the oil which makes it flashy. We tried the experiment twenty-five years ago and had to abandon it on account of the danger of burning the old wooden building we were in at the time; besides we got no perceptible benefit from it. A good and economical bath is the drip from the chest of the steam hammer. Use a little salt as a cleansing medium. The steam can be turned on at will to temper the bath to suit the steel in hand. Of course you can add any specific you have that you imagine is a restorer of lost vitality.

The proportions of a spring govern to an extent its elasticity and durability. The space should gradually decrease from the longest-drawn leaf to the shortest, making a graduated run. It makes the spring more elastic toward the ends and lessens the liability of breaking at its central portion. The question is often asked, "Why do the short leaves of a spring break first? There are two good reasons,—first, excessive gather or snap; second, the rigid band. Excessive gather throws too much strain on the short leaves. When the spring is clamped together for bending, it throws from one to one and a half inch more camber on the main leaves. It puts a strain on the short leaves to do this. When the spring takes its load, the long leaves act as levers on the shorter ones until this added camber is taken out. When they commence to take their load the short leaves have more than their proportion and it is only reasonable to expect them to break first.

The solid band not only destroys the resilience of the spring as its central portion, but provides an anvil to break the leaves over. A leaf of a spring or any other bar of metal that is subjected to shocks, strains and vibrations, will invariably break where it is held rigid, or where vibration suddenly ceases. For instance, if you were to break a short piece of steel off of a bar, you would hold the nick over the corner of the anvil. If you were to break a piece from a small rod or iron or steel and nothing in sight to do it with but a vise, you would put it in the vise and squeeze it tightly with the desired point of fracture even with the top of the jaws of the vise, and vibrate the bar back

and forth. It will break even with the jaw of the vise, or where vibration ceases. The solid band acts the same as the anvil and the vise. It destroys the elasticity; also the steel by crystallization at that point.

For the past fifteen years we have grooved all drawn leaves on one or both ends. We have a tool that nibs and grooves them at one operation. We have a gauge for each class of springs which is hinged to the tool, and which makes the work very rapid and accurate. The grooved leaf is an invention as old as the elliptic spring itself, so far as I know, but it is an addition to the spring that costs nothing, and it takes a great deal of the responsibility off of the band by holding the leaves in longitudinal alignment with each other. A great many springs have to be taken out and bands reset which are other ways all right. The grooved leaf obviates all of this trouble. We compress all springs before banding at double their load deflection. By so doing, any defect in the steel or bad manipulation at the hands of the spring-maker will become manifest and the defect remedied. It is less expensive to find these defects before the spring leaves the shop, than to do so after they are put in service. It also has a tendency to make the spring-maker more careful.

Report on Case Hardening.

WM. HODGETTS, H. HARRIS, HENRY HINKENS.

Case-hardening, as we all know, is a process by which we put a coating of steel on the outside of iron, for the purpose of getting a hard wearing surface, and still retain the inside of the material soft or unchanged. Wrought iron, if heated to a good red heat and brought in contact with granulated bone, or any other material in which there is a large amount of animal carbon, will absorb the carbon from that material, and the outside will become coated with steel, the depth of which is regulated by the length of time you keep the work in the furnace. Case-hardening to the depth of $\frac{1}{16}$ of an inch is enough for all practical purposes, and is even better than if you go deeper, as sometimes you will find cracks in motion work that are caused from hardening too deep.

Case-hardening to-day is not as serious a problem as it used to be, as most of our railroads have adopted the use of mild steel for all heavier class of work, such as crank pins, guides, etc. On the road with which I am connected we do not case-harden anything heavier than

links, lifters, eccentric blade jaws, etc.

Your committee has no new methods as to the process of case-hardening; in fact it would be a hard matter to come before this convention and set down any fixed lines as to how this work should be done in all shops, as that is out of the question. The larger shops on our different roads have the advantage of being able to get anything in the way of tools. They also have the mechanical engineer close at hand, with pattern maker and foundry to call on at any time they wish to build an improved furnace, but how entirely different in the small shops where the master smith has to rely on his own resources, and make shift with anything he can get, not even having a furnace, but usually some crude affair that he has had to make out of whatever old scrap he can get, and even using a piece of cast or wrought-iron pipe to place his work in. In spite of this, he will procure the same result we do with all our best improved furnaces and boxes and every facility for doing work. When conditions are favorable for doing this kind of work, we recommend an oil furnace placed close to the ground, so that the work can be easily removed from the furnace without raising or lowering the boxes, with the vat close at hand, so that there will be as little handling of the work as possible. The vat should also be placed in the ground with the water coming in from the bottom end so as to keep a constant circulation of cold water at the bottom, and an overflow pipe at the top to allow the surplus water to escape. A piece of perforated plate should be placed about four inches from the bottom of the vat and above the inlet, so that a cold stream of water can flow under the work to cool it quickly. The boxes may be made from either cast iron or boiler plate, if a foundry is at hand. Cast iron boxes are the best, as they can be easily replaced. The boxes should be about 12 by 30 inches long in size, with lid to suit, for such work as links, pins, bushings, quadrants, etc.

In packing your boxes be sure to leave enough space between the pieces to insure getting all the flux that is necessary. About two-inch space for large work, and one inch for lighter work is sufficient. In heating your work, do not urge the fire too much at the start, but give it time to heat thoroughly. After the box is hot it should be kept at the right heat from five to six hours, which will give you a case-hardening for all necessary purposes.

Report on Tools and Tool Steel.

BENJAMIN BURGESS, CHAIRMAN.

Tools.

Under this head are included all tools brought to the toolsmith to be made, dressed or repaired. Right here we are confronted with a field of inquiry that could take up all our time. We have only time to glance at it. It is conceded that a successful toolsmith is an artist, and every tool that passes through his hand is a triumph of chemical science and mechanical art.

We will not attempt to describe how tools for lathe, planer, slotter, etc., ought to be made. It is plain, however, that there is a right and a wrong way, a proper form for every tool, a correct angle, amount of clearance, etc. This we leave to the machinist to determine, and the toolsmith soon finds out that machinists, as well as doctors, differ. Therefore we hail with pleasure the "Gisholt system" with grinding machines that will grind at the proper angle, exact amount of clearance, and the tool dresser furnished with proper tools and forms; this will fill a long felt want. For the past fifteen years or more, we have been making our shear blades with cutting edges square instead of bevelled, with good results. By turning them around or upside down, we get four edges instead of one. All that is necessary is to have holes in blade central and countersunk on both sides.

Crucible or Carbon Steel.

We recommend three grades: Select for lathe, planer, slotter, screw cutting, dies, etc., the higher grade; for clipping chisels, hammers, etc., that have to withstand shock, second grade; for hot punches, fillers, flatters, sets, etc., the third grade. Your experience coupled with good judgment will prove the best guide for selecting the best steel for the purpose to which tool it is to be applied. How are we to get the best results from this wonderful metal with the different modes of treatment? We know of nothing better to recommend than the yearly proceedings of this Association. There will be found different modes of treatment to choose from, and experience will do the remainder.

Here are a few simple rules on which nearly all are agreed, and which must be followed to insure success: Select a good steel for the purpose for which the steel is intended; have a clean fire, a deep body of fuel to prevent the cold blast from getting through; heat slowly and thoroughly; use judgment in

forging; turn steel over and upside down frequently; see that your anvil is nice and smooth; never try to temper on the same heat of forging unless in a track pick. For machine tools, after forging to shape, lay aside until cold, then reheat as above, in a clean, deep, bright fire, slowly and thoroughly, not any higher than is necessary to get the required hardness, then dip in your cooling bath. For lathes, planers, etc., we do not think it is good policy to draw temper; a little practice with dipping will be found as satisfactory and more so.

We all know color stands for nothing unless the necessary hardness is first placed there; that a bright piece of steel in its natural state, or even a piece of iron, will show color just as well as hardened steel, and the probability is you will get as uniform a temper by dipping as by drawing. We have purposely avoided calling these different degrees of heat red, full red, dull red, cherry red, etc., as being too indefinite. Only the man behind the anvil with experience and good judgment knows what these heats are. The artistic part of this business must be acquired and cannot be taught.

It will be noticed there is much here that is very indefinite. The heat for hardening is indefinite, because the eye, wonderful organ though it be, has its limit and cannot register the degree of heat. Let us look on while a large reamer or tap is being hardened in the good old way. After getting by the eye the proper heat, it is removed and immersed in the cooling medium; there was, perhaps, from half an hour to three hours, according to the size of the tool, allowed to bring this tool to proper heat; this was to allow the grain or particles of steel to get into proper position for the coming battle; the tool is gradually lowered, the water boils with the intense heat. We notice small scales of iron or steel that are on the surface of the water are sometimes attracted and then repelled, as two of the greatest forces of nature are pitted against each other, fire and water—the same forces that destroyed Pompeii in years gone past, and Martinique a few months ago, carrying death and destruction all around; the same kind of a struggle is progressing in your cooling medium.

The operator feels the struggle going on; the action of the steel is conveyed to the tongs, from the tongs to the hand, from the hand to the brain; earnestly the operator watches as the

contest progresses; gradually the water becomes calm, the vibrations cease, no crack has been felt, and on withdrawing from the water it is found just about right—another good tool is added to the tool room. Now, who can tell what changes in the meantime have taken place while this process of refining was going on? Science has wrested many secrets from Mother Nature, but this she will probably never give up. Mystery appears at every step. This we call tempering by sight.

Tempering by Science.

The first thing we want is a good grade of steel and a knowledge of its contents. How are we going to find this out? By experience and testing. Now we want a good heating furnace for steel, one that is slow and steady, with a pyrometer to register the degree of heat. Raise your furnace until it reaches the degree of heat wanted, hold there until you are certain your steel is thoroughly heated through, immerse in your cooling liquid and your job is completed.

It will be noticed there is no guesswork about this; the eye may be deceived but here you are governed by laws that are absolute, and every day, whether dull or bright, the results will be exactly the same. This may be called tempering by science, and when everything is properly adjusted, any one can do the tempering. In this case there is no drawing of temper, there is no drawing necessary. You know you have the exact degree of hardness required.



A FORGED COPPER-INGOT TRUCK.—LOADING.

When tempering large quantities of small tools it is sometimes found necessary to draw temper. This is best done in oil in a pan over one or more gas jets. Place pieces in pan filled with oil, raise to correct temperature by thermometer, then turn down jet, allowing pieces to

cool off slowly. Such a device will prove a great saving in labor. Such a plant is only practical and is best adopted for large quantities, and for railroad shops generally; it may not be a necessity, but the way railroads are being merged, the day is not far distant when such a plant for tempering will be a necessity in all large shops.

Self-Hardening Steel.

For extremely hard work this steel has taken a prominent place, and so far is maintaining it. Of late, different modes of treatment have been recommended. The burning process is beneficial to some brands, while to others it proves to be detrimental. High-priced steel is being placed on the market; machines are being speeded faster and faster all the time; everything along this line seems to be in a state of chronic transition. It is evident, therefore, that nothing but the best grades of steel will prove satisfactory.

Concluding, we have confined ourselves to a strictly practical basis. The field is wide and limitless—the possibilities are great. We believe the steel question, with different lines of treatment will continue to thrust itself forward for recognition, until we receive from the manufacturers an article that will be practically perfect.

We have no experience with local patent treatment of steel. We hope some of our members will be able to throw some light along this line. Steel is being put on the market that is seemingly high priced, but if we can increase the amount of work from thirty to sixty per cent., then the price of steel is a very small item. The days of cheap steel are numbered, and those in authority who will only buy a cheap grade of steel will simply be relegated to the rear.

A Forged Hand Truck for Copper Bullion.

The two half tone engravings shown herewith are of a hand truck for copper bullion, designed by Mr. J. H. Brown, Junction, Arizona, for use in transferring ingots of copper from narrow to standard gauge freight cars. These trucks have been in constant service since 1898, handling the entire output of the United Verde Copper Mine at Jerome, Arizona.

As shown by the illustrations, the truck is constructed entirely of gas iron and steel, every piece of it (except the two cast wheels) being forged in the blacksmith shop. A steel hook pivots on a peculiarly-shaped fulcrum, which is riveted to the axle frame. This

hook has an extended portion which projects beneath the fulcrum and engages the floor when the truck is tilted backwards with the load, being thus



A FORGED COPPER-INGOT TRUCK.—LOADED.

forced backward behind the truck frame automatically. We are indebted to Mr. Brown for the photographs and details of this interesting creation of the hammer and anvil.

The Cure of Corns.

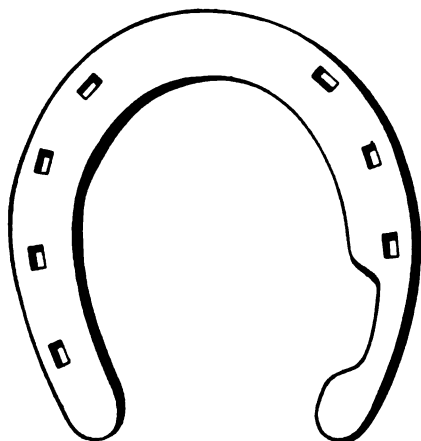
WILLIAM W. PETERS.

Corns are usually to be found at the inner heel, or at the angle between the bar and the crust, and are caused by the shoe pressing upon these parts. This will be most likely to occur should the wall break down, or be cut away to such an extent as to allow the shoe to rest upon the sole, or if the shoe should be nailed well back on the outside and toe. Then if it is left on too long, it will be drawn outward and forward, so much so that the inner heel will be drawn under the quarter and rest upon this part, bruising it. When the sensitive sole is thus bruised, the effused blood mixes with the horny matter and forms a red spot. If the irritation is continued, so as to produce very much inflammation, ulceration may take place, which would in some cases be sufficient to affect the inner wing of the coffin bone, and cause matter to break out at the coronet.

Sometimes when the quarter is very much contracted, the space between the bar and quarter being greatly lessened, it causes such bruising or pressure upon the soft parts as to excite inflammation, or cause a corn. The usual remedy is to cut away the parts, so that the shoe will not rest upon it, and put on a little caustic, or touch it with a hot iron, which destroys sensibility. The usual way in severe cases is to put on a bar

shoe, so as to remove all pressure from the sore part. This treatment is not curative. It will ease the horse for a time, but if the shoe is left on a little too long, or presses upon the parts in the least, or should gravel or dirt accumulate between the part and the shoe, lameness will follow. The only remedy for this is to remove the pressure, but in time, by this treatment, the difficulty is only aggravated and made worse; hence the assertion that corns can not be cured. I maintain that they can. The reason I say this is because I have cured them.

One of my neighbors had a horse with corns, one in each front foot. He brought her to me, and I shod her in this way. I took a pair of plain steel shoes, fitted them nicely to her feet. I held them in place while I took a pencil and marked the shoe over the



SHOE SPECIALLY PREPARED FOR CORNS.

corn. Then I cut that part out, and filed it smooth. The figure will explain my meaning. I shod her in this way until the corn disappeared. Now I shoe her with a plain steel shoe, and she travels with as much ease as a colt. You can put tips on and turn the horse out to pasture, and sometimes they will get all right, but by this method you can use your horse all the time.

Diseases of the Foot and Their Treatment.—9.

E. MAYHEW MICHENER, V. M. D.

Bog Spavin.

The above named disease of the hock is also known by the names thoroughpin and blood spavin. It is characterized by a soft and fluctuating enlargement of the synovial sac of the true hock joint, visible in front and to the inner side of the hock joint and in addition by another smaller point of enlargement behind the hock joint and visible on one or both sides of the large tendon known as the "hamstring" or tendon

of Achilles. Pressure made by the fingers upon the last named enlargements will produce a greater fullness and tension in the enlargement at the front and inner side of the joint, thus showing a communication between the two parts, which is made through the joint itself.

This condition of the hock is very common in hard-worked animals, and other conditions being equal is more likely to occur in animals, which have been worked hard at an early age. Conformation plays an important part in the causation, for hocks which are badly shaped are prone to spavin; sickle hocks, as well as those which are abnormally upright, are predisposed. The enlargement is due to an excessive secretion of synovia, or what is commonly known as the joint water. The excessive amount of the synovia distends the joint sac, and the enlargement makes its appearance at the points above named, because they are the points where the least resistance is encountered by overlying parts. Lameness seldom results from bog spavin, and while the presence of the condition is strictly an unsoundness, yet it is one which but rarely impairs the animal's usefulness as far as work is concerned. For breeding purposes, however, an animal with bog spavin is not desirable, as the tendency for transmission in breeding is well marked.

The treatment of bog spavin is rather rarely attempted, because a cure is rather the exception in well-advanced cases, and also because the condition is generally considered as a blemish only. In young animals and in mild cases it is sometimes possible to remove the enlargement by causing an absorption of the excess of synovia. Several methods of treatment tend to produce the desired result. A safe method is to coat the surface of the skin over the enlargements with a covering of some quickly-drying material, thus forming a compression upon the parts which tends to cause absorption of the synovia. Ordinary glue mixed with finely cut oakum or hair from the horse's tail may be applied with a brush, care being required not to have the glue too hot. Several layers are applied until a firm covering results. Another good application is the silicate of soda which is applied cold, additional layers being applied as rapidly as hardening takes place. Whichever material is used for the purpose, the coating is not disturbed, but allowed to remain until it comes off, when the treatment may be repeated

if thought advisable. Blistering bog spavins is sometimes practiced, but not generally with much benefit. Firing with the fine platinum point has given good results in some very pronounced cases, and is a fairly safe operation in experienced hands only. Heroic surgical treatment of bog spavin consists of opening the synovial sac either with the knife or with the hot firing iron. Some recoveries are reported, but the danger is certainly considerable, and rarely is a surgeon found so bold as to apply such treatment.

Prevention of bog spavin consists of care in the use of young animals, and the proper shoeing and care of the feet with a view of correcting as much as possible the faults of conformation. The sickle-shaped leg indicates use for the thick-heeled shoe and shortening of the toe of the hoof.

Another enlargement at the posterior part of the hock is that caused by dilation of the sheath of the perforatus tendon. This enlargement is found, when present to any considerable degree, just above the point of the hock, and is visible on both sides of the hamstring or tendon Achilles, which appears to divide the swelling into two parts from above to below. The enlargement is compressible from side to side, especially when the leg is lifted from the ground, but is distinguished from bog spavin by not causing enlargement at the front of hock when pressure is applied. This enlargement is most commonly seen in heavy animals where it seems to be the result of severe work. Lameness is very rarely caused by it. The treatment is essentially the same as mentioned for bog spavin, and the chances of the enlargement being removed are slightly better than in that disease.

Capped Hock.

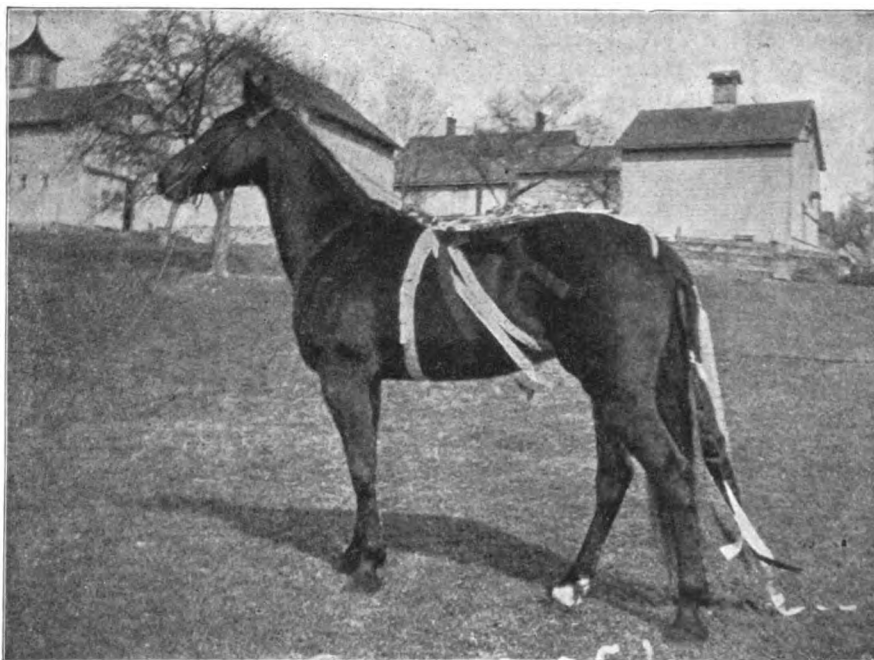
By the above name is included any enlargement of the point of the hock. It may consist of a simple thickening of the skin covering that region, or it may be the result of injury to the deeper structures of the part, namely, the subcutaneous connective tissue, the tendons of the perforatus or of the gastrocnemius muscles which together make up the strong cord commonly known as the hamstring, and in rarer and more severe injury the underlying bone of the hock, which at this situation is known as the os calcis, may be injured. Capped hock then varies greatly in its severity and importance. If the superficial parts alone are injured lameness is rare, but if the tendons or bone is

involved the lameness may be severe and persistent. The common cause of all cases of capped hock is direct violence to the part. The common ways of injury is by the animal kicking against some hard surface, as the side of stall. Injury of this kind is frequent in shipment of horses by car or boat on account of cramped quarters. Contact with the cross-bar of vehicles or with the singletree in heavy work is sometimes a cause. The presence of thick hocks at this point is in certain animals an indication of the habit of kicking in stable or harness, and animals showing it may be looked on with suspicion until their good habits are verified. Many colts are blemished for life by being kept in short or cramped stabling.

The treatment of capped hock, depends upon the condition of the case. If the injury is of recent origin and the swelling, heat, and pain of the part considerable, then measures calculated to reduce inflammation are to be employed. Place the animal in such a situation that the injury cannot be repeated. In the case of ill-natured animals, it is sometimes better to remove other horses from adjoining stalls. In some cases padding of the place kicked against, will be required. The application of very warm water to the swollen parts is good treatment, also very cold spraying with a hose is good either alone or alternately with the warm water. Twenty minutes three or more times daily may be required in severe cases, or where the parts are severely lacerated by contact with some rough surface a continuous small stream of cold water should be applied to the wound, through a small diameter of rubber tubing, tied to the leg by broad, but not tight, strips of muslin. Moderate exercise is an aid in the treatment of such cases as are able to walk, and where lameness is slight or entirely absent, work is beneficial. Open cuts should be treated by applications of some good antiseptic solution. One tablespoonful of creolin to a pint of

water is good for the purpose. After acute symptoms have subsided and all open sores, if any, have become healed, the application of the silicate of soda, as advised in treatment of bog spavin, is frequently of benefit; allow the coating of the soda to remain until it falls off of itself, when the parts may be again coated as before. The application of tincture of iodine repeated four times daily until the skin is rendered sore to the touch has given some good results. Blisters are also sometimes used but should never be applied to a recent case. Whatever form of treatment be adopted the process of removal is generally slow, and in some cases the enlargement never entirely disappears.

(To be continued.)



CUTE, "QUEEN OF GUIDELESS WONDERS."

A Remarkable Mare.

Cute, 2.05½, "Queen of Guideless Wonders," as she is termed by her owner, was first brought to the attention of the public early in the season of '99. She was bred at Round Top Farm, Bernardsville, N. J., by Hon. F. P. Olcott, sired by Lord Eldon, dam Winona, by Jersey Prince. As a three-year-old she started in at once taking a record of 2.21½, in a winning race; as a four-year-old she raced successfully, reducing her record to 2.17½. She was extensively campaigned as a five-year-old, again reducing her record to 2.15½, and paced a trial mile over a half-mile track in 2.10½.

She is a remarkably handsome mare, with a fine, clear-cut head, showing docility and intelligence in every line,

a round smooth barrel, with powerful quarters, giving her great propelling power, and a flat, cordy leg, and an elegant set of feet. She wears bar shoes all around, five ounce in front and four ounce behind. She wears knee boots, and quarter boots only in her exhibitions.

In the fall of '98, her education as a Guideless Wonder was begun. It was not difficult to teach her, as her racing education was perfect. She was an apt pupil, and she caught on to what was wanted of her from the start. At the first attempt she circled the half-mile track (New Paltz, N. Y.), twice, coming to a stop at the completion of the mile, which she made in 2.14½. She began her career as a Guideless Wonder the

following season, pacing forty-one exhibition miles, averaging 2.10 and a fraction. During the season of 1900 and 1901, she exhibited in different sections of the country, and at the present writing is on an exhibition tour filling her engagements. She has paced 108 exhibition miles from 2.10 to 2.05½ (and a trial mile in 2.04), mostly over half-mile tracks. No mare, living or dead, trotter or pacer, has paced as many miles in 2.10 and faster. The wife of her owner

has many records with Cute to harness, having gone an exhibition mile in 2.10½, half-mile track, also a world's record, besides numerous miles in 2.11 and 2.12.

Cute performs the feat of pacing alone at the top of her clip without bike, driver, or any prompting whatever. She not only goes alone, but with hearty thoroughness enters into the sport, for such it seems to her. She requires no pace maker, no guiding, no whipping, no urging.

She starts at the usual scoring place, and on getting the word "go" is off like the wind. She keeps to the pole, cutting "the corners short." She paces every mile as evenly as though guided by hand, always saving a burst of speed to finish on the home stretch. No

demonstration from the grandstand or crowds upon the track causes her to falter, but, rather, they incite her to better speed. She performs equally well on mile or half-mile tracks, whether fenced in or in an open field.

After passing the wire she appears to know her work is done, for she slackens her speed, comes to a stop and returns to the starter for recognition, viewing the crowd with an air of conscious pride and satisfaction.

For the above description of this interesting mare, we are indebted to her owner, Mr. V. B. Strong, New Paltz, N. Y.

The Scientific Principles of Horseshoeing.—12.

E. W. PERRIN.

Hot and Cold Fitting.

Much has been said both for and against hot fitting by some eminent authorities. For instance, Prof. Russell in his "Scientific Horseshoeing" speaks of hot fitting as a practice which cannot be too severely condemned; on the other hand, Prof. George Fleming, M. R. C., V. S., Principal Veterinary Surgeon to the British Army, in his prize essay on horseshoeing is just as strongly in favor of hot fitting.

The practice of hot fitting, like shaving, has its uses and abuses. For instance a razor is an excellent instrument to shave with, but because some demented person cuts his throat with one is not sufficient reason to deny others the use of a razor. In like manner a hot shoe is an excellent thing to get a perfect bearing with "a perfect juxtaposition between horn and iron" (Fleming), but because some inexperienced shoer pares the plantar surface of the hoof down to the vascular structure, then puts a hot shoe to that foot, thereby laming the horse, is not sufficient reason to deny all shoers the use and advantages of hot fitting, any more than it is right to argue against the use of nails to secure the shoe to the hoof, simply because some shoer pricked a horse in driving the nails. This argument against the use of a practice which it is possible to abuse is on a par with the act of a cranky veterinary surgeon once in charge of my regiment, who, because one shoer pared the sole of a hoof too thin, collected the knives from every shoer in the shop. Superintending the shoeing in person, he made us prepare the hoof with a rasp only, arbitrarily keeping us without the use of this most useful and necessary tool, the knife, for months.

That an inexperienced shoer sometimes fits a shoe too small, chops off

the wall to fit the shoe, and invariably pricks the horse as a natural result, is readily admitted, but then there was no excuse for chopping away this wall, and had he fitted the shoe big enough, and left the wall to nail to, he would not have pricked the horse. In like manner, if a shoer pare a hoof so thin that it is almost bleeding, to put a hot shoe to such a foot would cause pain and lameness, but then there is no excuse for paring a hoof so thin, and if nature's protection—the sole—had not been so ruthlessly cut away, the shoe could have been fitted hot with advantage. It is a great mistake to pare the hoof so thin that you cannot try a hot shoe to it for a few seconds without risk of injury. The foot of the domesticated horse should carry as much sole as those in a wild state, as a protection to the sensitive structures from injuries from stones, glass, nails, etc. When you next have an opportunity to dissect a foot of an unshod horse that has not been unduly thinned by paring or a long journey without the shoe, saw it through from toe to heel, and when you see the natural thickness of the horny sole, you will be convinced that you could fit a hot shoe to such a foot without risk of injury.

Some years ago it was a common practice to pare the horny frog to a standard shape, and much harm resulted from it. Veterinary surgeons took the matter up and much was written against this pernicious practice. Then both horse owner and shoer went to the opposite extreme of not cutting the frog at all. Now there is a great difference between cutting away all the frog, and simply trimming away semi-detached horn—which harbors dirt, producing thrush—in like manner there is a great difference between trying a hot shoe on a foot for a few seconds, and roasting a hoof for a few minutes.

I have seen cold fitting given a very extensive trial. Some sixteen years ago, when machine made shoes were first introduced into the British Cavalry, four troops of my regiment were shod cold and four hot, and the shoeing smiths soon became efficient at cold fitting. But the difficulty of obtaining a perfectly even bearing between horn and iron was never surmounted, as was amply proven by the large number of shoes lost at maneuvers from off the cold shod horses. If I have to deal with a customer who does not approve of hot fitting, I take great pains to fit his shoes cold; but you may hammer a shoe as level as possible, and rasp the

surface of the hoof as level as an expert mechanic can make it, but the end of the horn fibres prevent a true and equal bearing between horn and iron, and as a general thing, when the shoe is nailed on, you can see daylight between hoof and shoe—an uneven bearing—and this inequality of the distribution of the weight is admitted by all writers to be very detrimental to the health of the foot.

In hot fitting, the shoe should not be red hot, but simply hot enough to char the ends of the fibres, and should only be held to a foot for a few seconds, under which circumstances hot fitting is a great advantage,—in fact it is the only way, as Prof. Fleming says, to obtain exact juxtaposition between horn and iron. I therefore recommend the use, not the abuse, of the practice of hot fitting.

The Use of Rubber Pads.

The principal use of rubber pads is the adaptability of rubber to save not only the foot, but the whole limb, from the concussion resulting from work on hard roads and paved streets. But rubber pads do much to restore the health of the foot by restoring as nearly as possible the natural distribution of weight over the plantar surface of the foot. The pad affords frog pressure, also some pressure on the margin of the sole, and the hoof being packed with tar and tow, which is the best substitute known for nature's packing—moist earth—we have a pretty close imitation of nature's plan.

The ordinary shoe obliges the wall alone to carry the whole weight of the horse, and this unequal distribution of weight, together with concussion and the want of moisture, is the cause of 70 per cent. of the cases of foot lameness. The rubber pad—properly applied—restoring as it does, the natural distribution of weight, does so much to restore the healthy functions of the foot. The pad is an important adjunct in the cure, but far more important in the prevention of many forms of foot lameness, because the pad, closely imitating nature's plan, keeps the foot sound much longer, even under the very trying circumstances of street work.

Rubber pads are useful for all kinds of foot lameness, except in the few cases where frog pressure is not admissible. As showing the value of a pad in restoring the foot to its normal dimensions, you may sometimes have occasion to use a pad on one foot on account of some form of lameness; if so, measure both feet carefully, make

a note of any peculiarity in shape and form, and keep it for record. Measure the feet again in three or four months and you will find that the one which has worn the rubber is wider at the heels and in far better condition than its fellow that has been shod with the ordinary shoe. I have kept a doctor's mare in this city sound for six years of steady work by the use of rubber pads. She was pronounced incurable on account of a shrunken inside quarter, resulting from a barb-wire cut. I have used pads for corns, contraction, laminitic feet, split hoof, side bones, ring bones, etc., with eminent success.

As regards mistakes in the application of pads, some shoers have failures with pads because they are not properly applied, or because they select pads not suited to the case. For instance in horses shod with ordinary shoes, especially with calks, the frog in its effort to reach the ground grows as high as the shoe, while the heels of the hoof are often low. Hence when the shoe is removed, the frog projects high above the heels. Now you cannot successfully apply a pad to a foot in such a condition, because the elevated frog prevents the pad coming down on the heels. To remedy this, some shoers pare the frog down as low as it will stand, but the frog cannot stand the sudden change, and lameness is usually the result. In such a case use a bar shoe and leather sole for about six weeks, arch up the bar so that the frog takes but little weight at first, and in two weeks you can remove the shoe, heat the bar and hammer it a little lower. Repeat this in two weeks, and you will find the frog sinking back to its normal position, while the heels—having been thus relieved of the abnormal weight—will grow higher, and as soon as the heels are even with the frog, you may apply the pad with success. Again there are some pads which obtain more sole pressure than others, so that in selecting a pad for a thin flat sole, avoid sole pressure until the foot has grown more protection—more bottom—in which condition it will be benefited by carrying its natural share of weight.

With reference to the application of frog pressure I would remind you that you must change conditions gradually. When a frog has been deprived of its natural function for years, and you wish to restore it to normal conditions, you must be careful how you make the change. If you desire to use rubber on a foot where frog pressure is not

admissible, as for instance in navicular disease, or thrush, use a Goodyear shoe.

There is another advantage in the use of pads which should not be lost sight of, and that is the excellent protection they afford to the foot against injuries from foreign bodies, such as stones, glass, nails, etc.

There is some prejudice among some horsemen against the use of rubber on horses' feet. I have met with some who are strongly convinced—I fear without proof—that rubber is not healthy for horses' feet. Some say that rubber draws the feet, that in time it rots the sole and frog. True, the sole that is covered up gets soft and the frog somewhat mushy, but this condition is the result of the packing, not the rubber, as is proved by the presence of identically the same condition under a leather sole, wherever tar and oakum are used. I have never met with a case where the use of tar and tow did a foot any harm, and I know of thousands of horses shod with leather soles, tar and oakum all the time. If rubber is any detriment to a foot, a case of the kind has never come under my notice, and I put rubbers on in England fifteen years ago. I could name some half dozen horses in this city that have been shod with rubber for the last five years, and their feet are in excellent condition. However, for those who prefer not to cover the sole of the hoof, there are several makes of open pads. Now as to the choice of pads, I know of no pad on the market to-day which has not some excellent merit, and I know I would not use a horse of my own on streets or hard roads without rubber pads on the front feet.

Appended is a list of firms manufacturing rubber shoes and horseshoe pads:

Consolidated Hoof Pad Co., 18 Vesey street, New York City.

Davie & Co., 1310 Wallace street, Philadelphia, Pa.

Dryden Hoof Pad Co., 433 Wabash avenue, Chicago, Ill.

Goodyear Tire & Rubber Co., Akron, Ohio.

Hahn Manufacturing Co., 356 Grand street, New York City.

M. Hallanan, 186 W. 4th street, New York City.

Wm. Killion & Sons, 20 Cambria street, Boston, Mass.

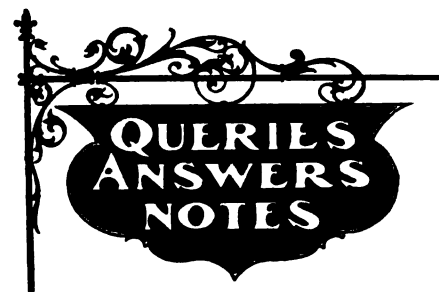
Neverslip Manufacturing Co., New Brunswick, N. J.

T. C. Octigan, 11 E. 26th street, Chicago, Ill.

Revere Rubber Co., Boston, Mass.

Western Horseshoe Pad Co., 56 5th avenue, Chicago, Ill.

(To be continued.)



The following columns are intended for the convenience of all readers for discussions upon blacksmithing, horseshoeing, carriage building and allied topics. Questions, answers and comments are solicited and are always acceptable. For replies by mail, send stamps. Names omitted and addresses supplied upon request.

Welding Compound—Can someone give me a recipe for a first-class welding compound? B. B. B.

A Question About Axles—I desire to know how to put a wooden axle with skeins in a lumber wagon, the gather, draft, etc. H. O. WALKER.

A Shoeing Question—I would like to ask some good horseshoer how I can shoe a horse that walks on his heel when he steps and then rocks forward. He is the same in both feet. BEN MUSTO.

How Shoe a Turned-Under Foot? I should like to have some brother shoer tell me how to shoe a horse who has the outside of his foot turned under. I would like to know how to straighten it. W. TRAMMEL.

A Plow Work Question—Will some brother smith with experience in this line of work, explain to me what section or shape a plow lay should have for old ground and also for very hard ground. What shape gives the lightest draft? HANS HANSON, JR.

How Can Shoes Best be Made to Stay on? Will some brother blacksmith tell me the best way to make a horse's shoes remain on? Should the nails be driven high or low? Also what is the best nail to use to make them stay on a long time? W. H. HAHN.

How Make Ready-Mixed Glue—I would like to ask some brother smith through THE AMERICAN BLACKSMITH for a good receipt for making ready-mixed glue. It is considerable of a nuisance to be obliged to cook glue every time a small job requires it. J. W. SUMMS.

Soldering and Brazing—I should like very much to have the experience of some of my brother craftsmen as to what they have found to be the best methods of soldering and brazing, especially brazing, as I have considerable of this work to do myself. W. J. PARKER.

Gas Engine Inquiry—How large a buzz saw will a 2½ horsepower gas engine like the Weber Jr. require to drive for cutting cord wood? How much gasoline will it burn running eight hours at its full capacity? Also how many revolutions should a saw run to do the best work? HANS HANSON, JR.

How Weld Up Plow Lays—What is the best plan for welding up new plow lays? Is there any possible way to prevent their springing when subjected to the hardening

compound? Does the quality of the compound have anything to do with the springing of a lay? I refer particularly to hardening old lays. W. A. HENRY.

Removing Obstructions from Drilled Wells—In reply to the question of Mr. G. W. Dycus in the August issue about tools for removing piping and buckets from drilled wells, I would say for buckets, that if he knows the size of the buckets on the inside the best way is to take a piece of square iron that will fit tight on the inside of the



TO REMOVE
PIPING FROM
DRILLED WELLS.

bucket, draw the end down tapering so that it will start on the bucket easily and then with a chisel cut the corners down so as to form barbs. By driving this down into the bucket, the latter can be removed unless it is stuck fast.

For removing pipe, take a piece of casing about three feet long, rivet a piece of heavy wagon tire to each side of pipe, about three and one-half feet long, and bring this together at the top, fastening to a smaller pipe, to which the rope is to be fastened. By driving this down over the pipe, the latter will wedge between the side irons and in this way the pipe can be removed. See illustration.

If this fails, take an old car spring or any good spring steel that is large enough and make two jaws sharp on the end. Rivet these on the inside of the casing at the bottom, so that the jaws reach up inside the casing and come nearly together. When forced over the pipe the jaws will catch, and the pipe can easily be removed.

J. IVAN RANDALL.

To Tighten the Band of a Warner Wheel—Rest one side on the edge of the anvil and set the band to the wood with the hammer all around. Do this on both sides, and in many instances it will save the wheel, though it will leave the band bruised up with the hammer marks. There is little or no danger of breaking the band however.

J. W. RESPESS.

A Plea for Better Prices—I would like to hear from some of my fellow blacksmiths with regard to some plan for establishing a proper price for shoeing. We blacksmiths out in the country are driving new shoes for 25 cents per shoe, and feel that it is not enough in view of the advanced price of iron and nails. It would be a great benefit if we could come to some understanding, one with another, by means of a union or association, and secure a uniform price for shoeing which would allow us a proper profit at all times. I should like to hear from country smiths on this subject.

J. M. SMITH.

A Question on Interfering—I should like to hear from some brother smiths as to their experience on horses that interfere. I have a horse to shoe which interferes so badly that he has large knots on his hind and also his front pasterns. I find that he does not interfere quite so badly when he is barefooted. What would be the best way to trim the feet of the above horse, and also what kind of shoe would you use? In putting on side weights on which side ought the weight to be, the inside or outside?

Another question is, how should a horse be shod that overreaches and strikes his front heels every step? Inform me as to how to trim his feet. T. C. CAMFIELD.

Plow Lays—I noticed in the May number an article by Mr. Bruton telling how he put on a plow lay. His method sounds very ancient to me. Now the way I put on one is first to fit a short landside just as I want it to fit the plow, projecting about one-fourth of an inch below the bottom of bar. I then clamp it on with a pair of tongs, after which I fit my lay. I now put the landside and the lay in the fire, taking a welding heat on both of them. Then I have my helper take the landside and put it in an Ideal landside holder and place the lay where I want it, projecting over the landside holder about a quarter of an inch. I weld it down and upset the shin. I never have any trouble with my lay breaking loose. C. B. WOOD.

The Welding of Springs—In welding springs many smiths split them, but according to my view this is all wrong and I scarcely ever saw a good weld formed by so doing. My plan is to take the spring, get a short heat on it and upset the edges, making a very short scarf, which I hack with a hot chisel. I then take a borax heat, and put the parts together. After this, I clean the spring all off with an old rasp, and laying it over my fire, I apply the borax as the heat comes on without removing it from the fire. I use a striker and finish up by water, hammering until black. On a lap weld, the shorter the better, and you can scarcely find the weld.

An old wheelwright was in my shop once when I was steeling a mattock, a difficult tool to make. I struck with my hammer, as also my striker, as fast as we could, but the result was a poor weld. He asked why smiths do this and almost always fail to make a good steel weld. His theory was that the rapid blows strike in one place and loosen in another before it had time to unite. In my opinion he was right. The main thing is to be patient and take your time. No craft in the world has as many trying things to contend with as the blacksmith. I often have said that poor old Job wasn't a blacksmith.

T. J. WALLACE.

A Few Words on Tire Setting—I wish to reply to Mr. C. W. Smith's opinion of cold tire setting in the August issue. He says that cold tire setting will do very well on a solid wheel. The great difficulty is that it will dish wheels too much, when the bolts are not removed. I have had thirty years experience in this business. I purchased a Schau Cold Tire Setter a year ago in July and have been using it ever since. I can do much better work with it on any wheel that has not got to be repaired than I can do the old way and in one-fourth the time.

The great advantage is that you need not dish the wheel a particle. You can dish it little or much just as you please, for when you stop the lever the dish stops right there. The tire is cold and everything is finished.

On three-quarters of all the wheels, the tire gets loose on one side first, or in one little space, while the other side is all right. In this case you can put your machine on near the loose side and upset it, which it will do very easily and nicely. Also you can set a tire on a newly-painted wheel without making a mark on the wheel except on the edges of the tire. No man can

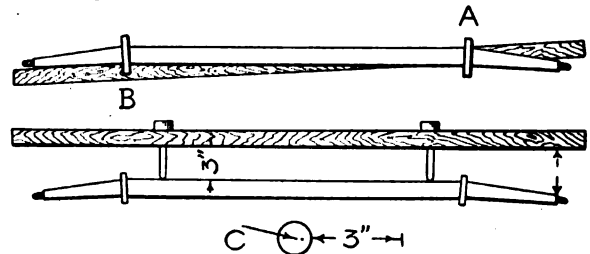
set a tire the old way without disturbing the paint. There are many other advantages of the tire machine, which I could mention if I had the time. W. B. NELSON.

To Remove Cinders from the Eye—I wish to bring to the notice of the craft something which I have found very useful, a trick which was imparted to me by a brother smith. The blacksmith shop is necessarily more or less dusty, no matter how well swept, and a gust of wind will sometimes locate a speck of dirt in one of the eyes, and it is there to stay. Sometimes specks of scale will find their way there and the same trouble is experienced to get rid of these. I was visiting a brother smith in his shop one day, and while there caught a speck of dust in my eye. I, of course, rubbed, but he said: "Hold on, I will get that out." So he pulled out a hair from the tail of a horse standing near by, bent the hair in the form of a loop about one and one-half inches in length, keeping the ends between the forefinger and thumb. Then with the other hand he gently raised the eyelid and pushed the horsehair loop up under the lid as far as he could. He then told me to close the lid firmly. After this he pressed the lid firmly on the ball and pulled the loop out from under the lid and lo! the obstruction was gone. I have since then used this method often, and in nine out of ten cases it succeeds. Of course, for severe cases a doctor had better be called, as the eye is a very delicate member and cannot be trifled with. Still the horsehair remedy does not hurt or injure the eye. If any one of the craft knows of a better method of home treatment, I should be glad to hear from him.

VETERAN.

Axle Setting—In answer to R. G. Parson's queries on axle setting, I take pleasure in giving the following methods as being very excellent ones for the approximate setting of axles: The first way is to place one edge of an iron or wood straight-edge even with the top of the axle at one corner, as at A, and even with the bottom of the axle at the other corner, as at B, and then make the bottom of the journal lie in line with the straight-edge. I always get very close to a plumb spoke in this way. I give the axle gather at the eye, by making the journal straight with the front edge of the axle.

Another more accurate way of setting axles is to have an axle set with hard wood or iron with removable iron points, in order to use it for wide or narrow axles. The two points or pegs should be of quarter-inch rod iron about three inches long. To get the set of the axle take your compass and describe a circle exactly equal in diameter to the size of the journal at the point. (Not the threads but the journal).



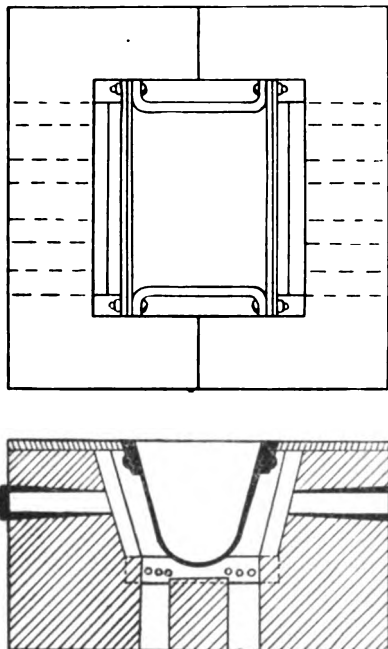
AXLE SETTING METHODS.

Then open your compass to three inches or exactly the length of the pegs on your set, and after laying this distance off from your circle, as indicated in the cut, increase the opening of your compass or dividers sufficiently to allow for the dish of the wheel. For new wheels, I usually allow about a quarter of the circle's diameter, as shown at C. For dish wheels, I set

the axle down a little more. You can calculate the exact set of axles if you wish and apply it in the above way. This is a very satisfactory rough and ready rule. Having gotten the correct distance on your dividers, the points of the axle should then be set down from the straight edge exactly this distance. M. S. HEWITT.

Contraction and Corns—I should like to join in the discussions going on in the columns of your paper, and having had twenty years' experience, may be able to say something which will interest the younger members of the craft.

In regard to horseshoeing, I have had considerable success in the same and



FIGS. 1 AND 2. TOP AND SECTIONAL VIEW—GALVANIZING KETTLE SETTING.

attribute it, first to the close and practical study of my work; secondly, to the careful observations of methods of work wherever I went; and thirdly, from a perusal of papers such as *THE AMERICAN BLACKSMITH*.

Considering the question of contraction, perhaps many may be surprised to know that contraction in some cases is hereditary. One of my customers kept a stallion and raised all his own stock; his mares were very bad with contraction and all their offspring were the same, and had to be treated from the first shoeing. Ordinary methods, such as shoes convex at the heels, or putting on a shoe wider than the foot and drawing the foot with the nails, would be no good in this case. Something quicker must be had. Hence I made a screw or expander which I have used very successfully ever since. It is an arrangement inserted between the heels, which are then expanded by means of a screw, and the shoe then being nailed on, the foot stays spread. In a short time you will effect a cure.

Referring to corns, Mr. Kenyon says there are no such things. This is obviously an error. A corn is a callous lump caused by undue pressure, generally on the inside heel of a horse's foot. Some one was pleased to call this a corn, which it seems to me is a very good name. I suppose Mr. Kenyon will not attempt to deny the existence of this callous spot in many horses' feet. My treatment is to pare them well and destroy them by dropping on muriatic acid. W. H. JEKILL.

To Weld Axles Successfully. Regarding the welding of steel axles, some brother craftsmen advise splitting and putting the short arms inside of the V. I think that is a poor plan and a vast amount of unnecessary work, giving in the end a poor looking job at the best. Two things are absolutely necessary for a good job, plenty of material and a good fire. Without these it is impossible to make a job. I have seen smiths fret, sweat, fume and, I am sorry to say, use "cuss words," and make a miserable failure in the end, not knowing what the trouble was, while all the time the difficulty was with the fire. So many of the craft set their tuyere irons too high, and again, when building their fire, I have seen them clean all the fine dust and ashes away, throw on a lot of green coal and go to work, the result being failure all day, to be repeated again the next. I never allow anyone to clean away the dust entirely from my fire. Indeed I take very little away at a time. I always coke my coal about half and use water. By so doing, you can make a heavy weld in a small fire.

Now we are ready for the axle. This I upset well before scarfing, making a fairly long lap. I always scarf front and back, never top and bottom. The reason for this is obvious. Hack your scarf well, have a good clean fire, and heat your pieces on top of the fire, for they will be down into the fire enough by the time you have a heat. Put on a steady blast, heat slowly and avoid taking the pieces out and in to look at them, for two or three times is sufficient. I use no borax or welding compound of any kind on the first heat. When hot, take out the pieces, give them a hard blow on the anvil to knock off the impurities. Let about one-half of the scarf of the bottom piece project over the anvil so that the point of lap will not cool off as it does when in contact with the cold anvil. The smith and his helper should then push the pieces up against each other. Don't be in a hurry, but keep your hammer off for three or four seconds, and then with the pene of the hammer tap lightly over the point of the lap. Then turn over and pene down all high or uneven places. Now, if necessary, clean your fire, make it up in good shape, lay your axle on as before and heat slowly, as I find the outer surface will sometimes burn when the inner parts will not be heated enough to weld. If you think best you can use borax, although I imagine it only adds to the slipperiness of the stuff and is of no immediate benefit. I use none at all on axles or tires, and rarely miss a weld. If the above instructions are carried out, you will experience no trouble. T. J. WALLACE.

Galvanizing Work. My work is used in salt and accordingly needs to be protected against rust. Can you inform me how to put in a small galvanizing tank, so that it would be profitable to use for small jobs ranging from \$5.00 to \$10.00. I would like to know how to prepare the iron. Also how to prepare the coating substance and how to use it. If you can inform me on this subject it will benefit me greatly in my trade. W. L. PAUL.

Coating articles made of steel and iron, with zinc, or, as the process is generally known, "galvanizing" them so as to retard oxidation, has become quite common.

When installing a galvanizing plant, bear in mind that the fumes of the chemicals used are destructive to tools and machinery. For this reason the outfit should be in a building by itself. The

size of kettle should be determined by the amount of galvanizing to be done. As it is very difficult to control the heat in a small body of metal, it is not advisable to use a kettle, for any purpose, less than three feet in length, twenty inches in depth and eighteen inches in width. The kettle should be made of refined iron or best fire-box steel. Considerable water is used in this work and provision should be made to secure proper drainage.

Figs. 1 and 2 show a method of setting a small kettle that is not to be operated continually and which is to galvanize small articles. The grates *c c* in Fig. 3 are bars of iron that can be withdrawn when it is desired to allow the fire to go out and replaced when required for use.

In filling a kettle with pigs of zinc, or as it is termed in the trade, "spelter," place the metal in a way so that it will lie very close to the sides of the kettle. If this instruction is not heeded the kettle is apt to be injured by the heat. Do not allow the fire to burn too freely in melting a kettle of zinc, or firing up a kettle that is full of cold zinc.

The principal materials used in galvanizing are zinc, sal ammoniac, sulphuric and hydrofluoric acids, and gas coke.

The tools employed in this work usually consist of tongs of various shape and sizes, baskets of sheet iron or heavy wire cloth and wires bent in various shapes.

Nearly all articles made of wrought iron or steel or of sheet metal are covered with more or less heavy scale, which must be completely removed before the zinc will adhere. To remove this scale make a pickle of sulphuric acid and water, one part acid to twenty of water and bring the solution to a temperature of about 150 degrees F.

To enable the zinc to take to the work quickly and firmly make up a solution of muriatic acid and water. This acts as a flux and also removes any rust that has

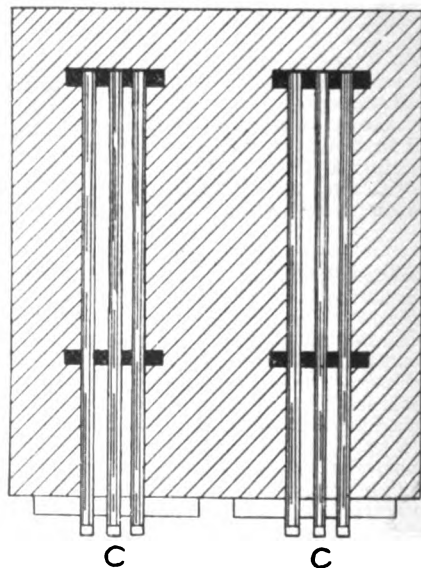


FIG. 3. GRATE BAR SETTING.

formed on the work and which the sulphuric acid pickle failed to remove. If rust has not formed on the work, all that is necessary is to immerse it for two or three minutes in the muriatic mixture. However if rust has formed the work must remain in the mixture long enough to remove it. This solution is made by diluting the acid about one-half and adding one pound of sal ammoniac to a gallon of the mixture. E. G. Z.

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All prices, except on the bolts and nuts, are per hundred pounds. On bars and flats prices are in bundle lots.

Bars—Common Iron and Soft Steel.
 $\frac{1}{4}$ in., round or square; Iron, \$3.10; Steel, \$2.90
 $\frac{3}{8}$ in., " " " 2.70 " 2.70
 $\frac{1}{2}$ in., " " " 2.50 " 2.40

Flats—Bar and Band.
 $\frac{1}{4}$ x 1 in., Iron, \$2.50; Steel, \$2.40
 $\frac{1}{4}$ x $1\frac{1}{2}$ in., " " 2.40; " 2.40
 $3\text{-}16$ x $1\frac{1}{2}$ in., " " 2.00; " 2.00

Norway and Swedish Iron.
 $\frac{1}{4}$ in., round or square, \$4.90
 $\frac{3}{8}$ in., " " 4.50
 $\frac{1}{2}$ in., " " 4.30
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 For No. 4 shoe, $\frac{3}{4}$ x $\frac{3}{8}$ in., 2.90

Toe Calk Steel.
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Spring Steel.
 $\frac{5}{8}$ to $1\frac{1}{2}$ in. Rounds, Op. Hearth \$4.00, Crucible \$6.00
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 $\frac{1}{4}$ x 3 in., .62 $\frac{3}{8}$ x 6 in., 1.31
 $5\text{-}16$ x 2 in., .65 $\frac{1}{2}$ x 4 in., 1.70
 $5\text{-}16$ x 3 in., .75 $\frac{1}{2}$ x 6 in., 2.10

Tire Bolts. (Net Price per Hundred).
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 $3\text{-}16$ x 2 in., .21 $\frac{1}{4}$ x 2 in., .31 $\frac{1}{2}$
 $3\text{-}16$ x 3 in., .27 $\frac{1}{4}$ x 3 in., .37 $\frac{1}{2}$

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 $\frac{1}{2}$ in., .05 " "
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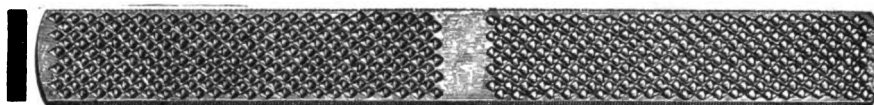
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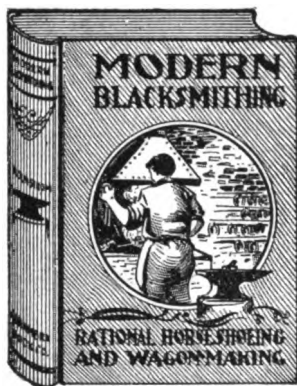
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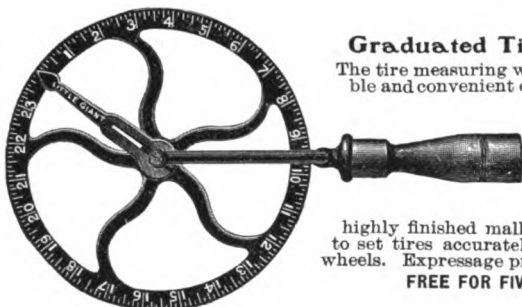
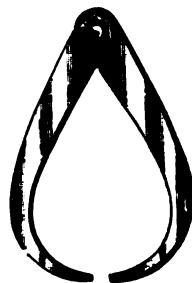
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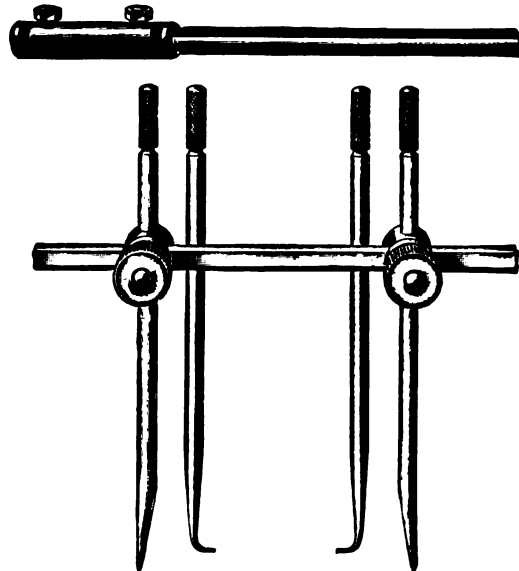
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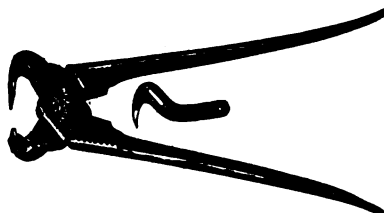
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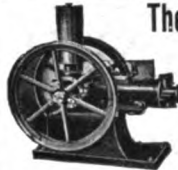
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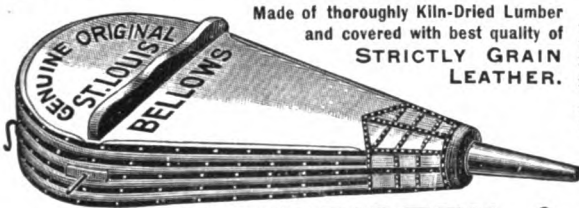
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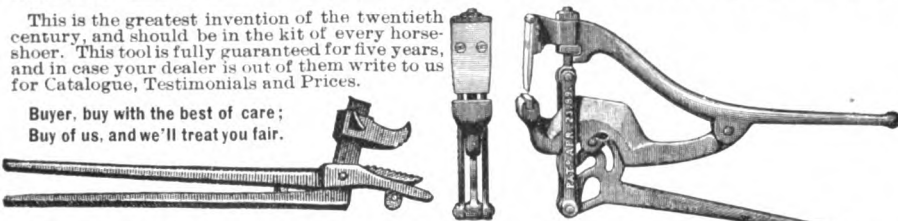
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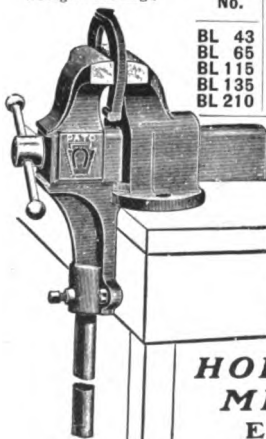


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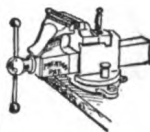
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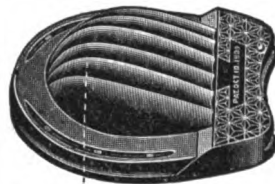
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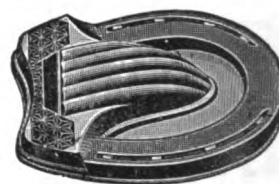
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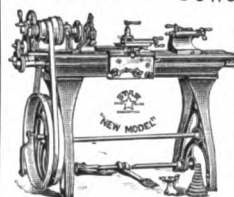


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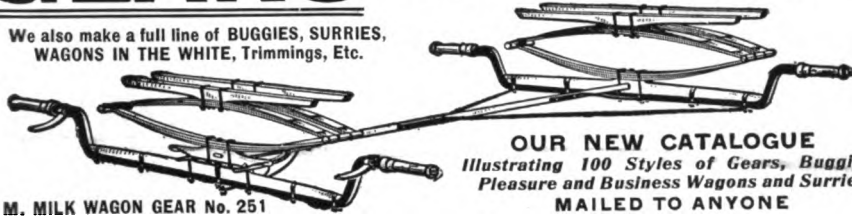
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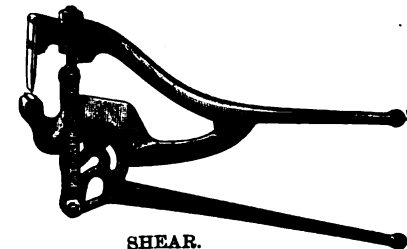
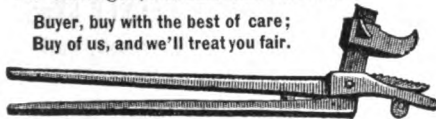
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Guaranteed for Five Years.

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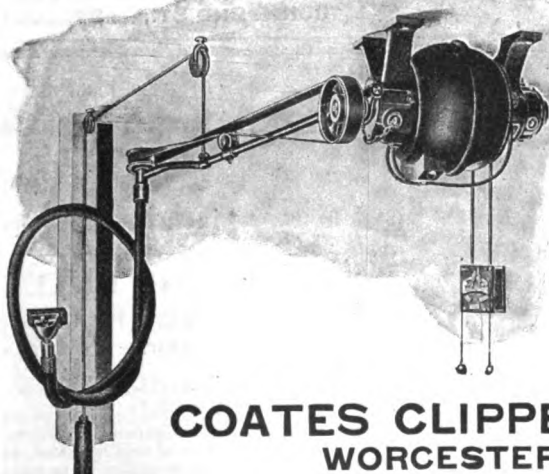
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<input type="checkbox"/> Refrigeration Engineer	<input type="checkbox"/> Architectural Draftsman
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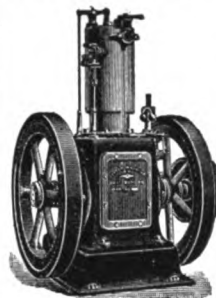
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GASOLINE
ENGINES..

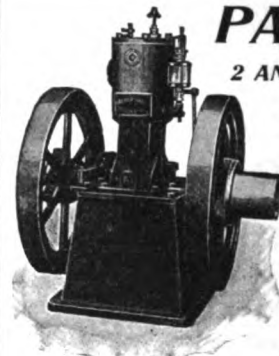
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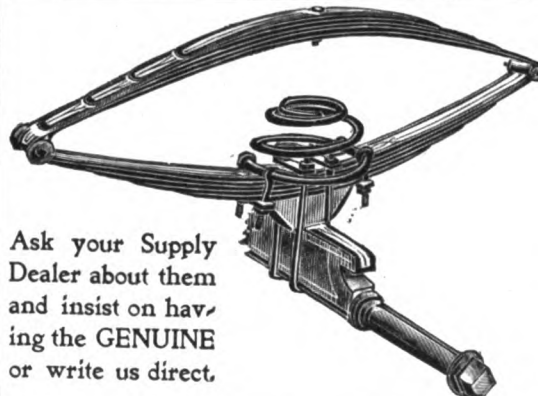
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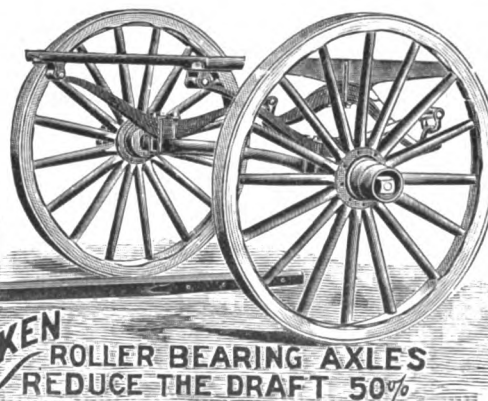
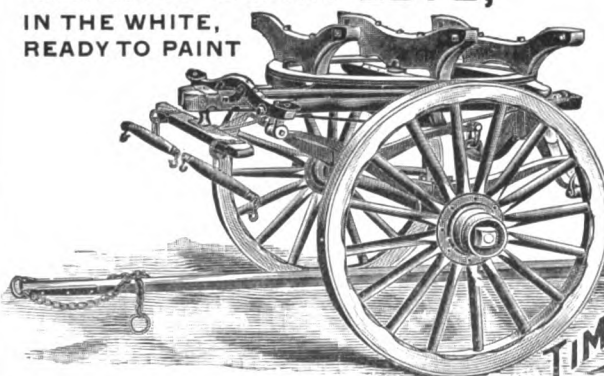


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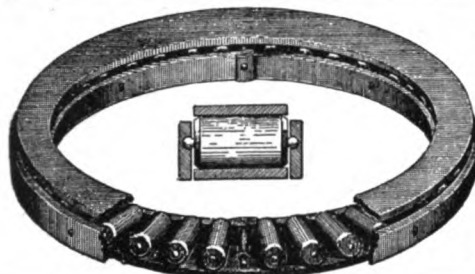
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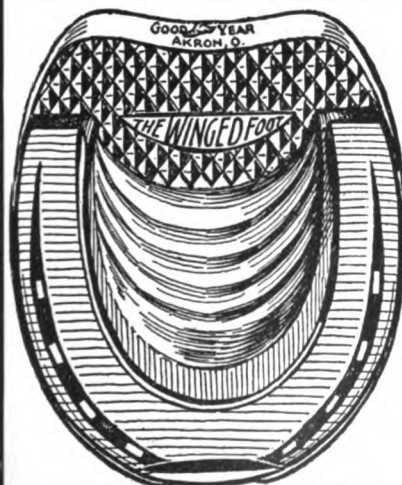
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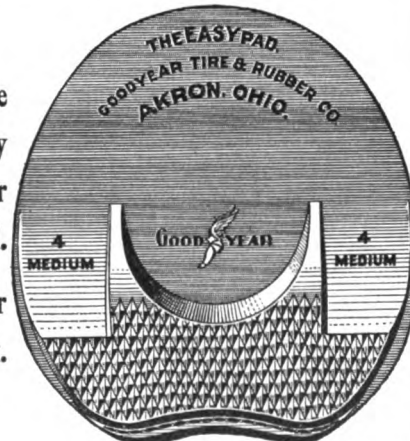
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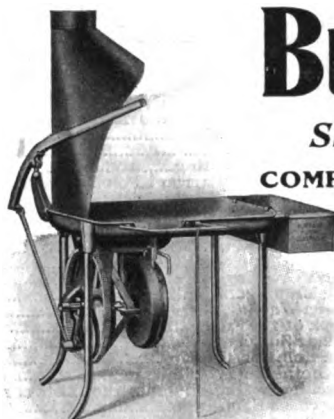
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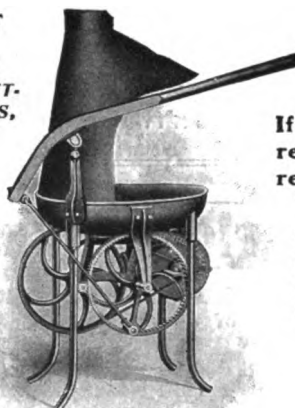
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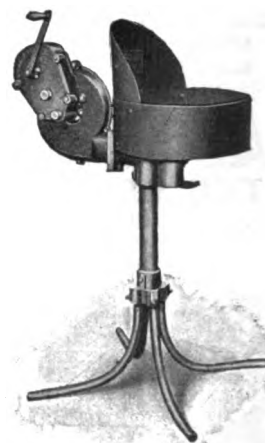


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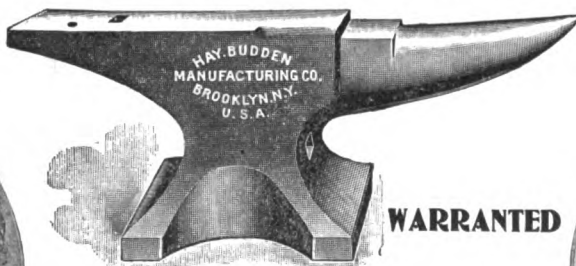
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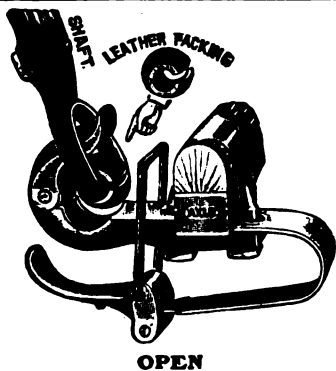
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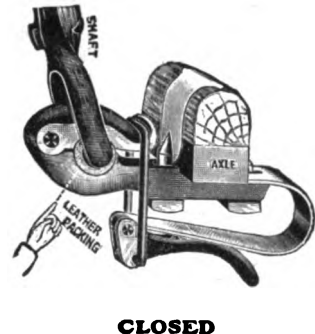
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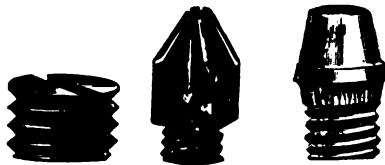
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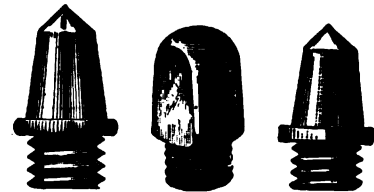
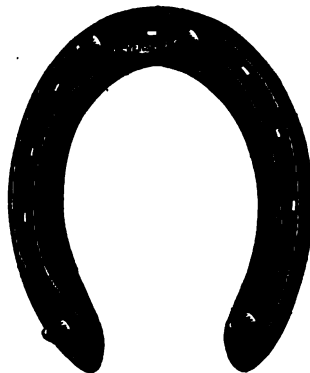
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U. S. Patents covering the No. 400 Steel Blower and Steel Forges granted June 11, July 30, 1901, and April 15, 1902.

Patent Numbers:
676,322 34,882
676,323 34,883
676,324 34,884
34,880 34,885
34,881 697,629

— ALSO —
Great Britain Patent No. 9,662, May 25, 1900.

WHAT is Spiral Gearing?

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DURABLE—BECAUSE it has less working parts and is simpler in construction.

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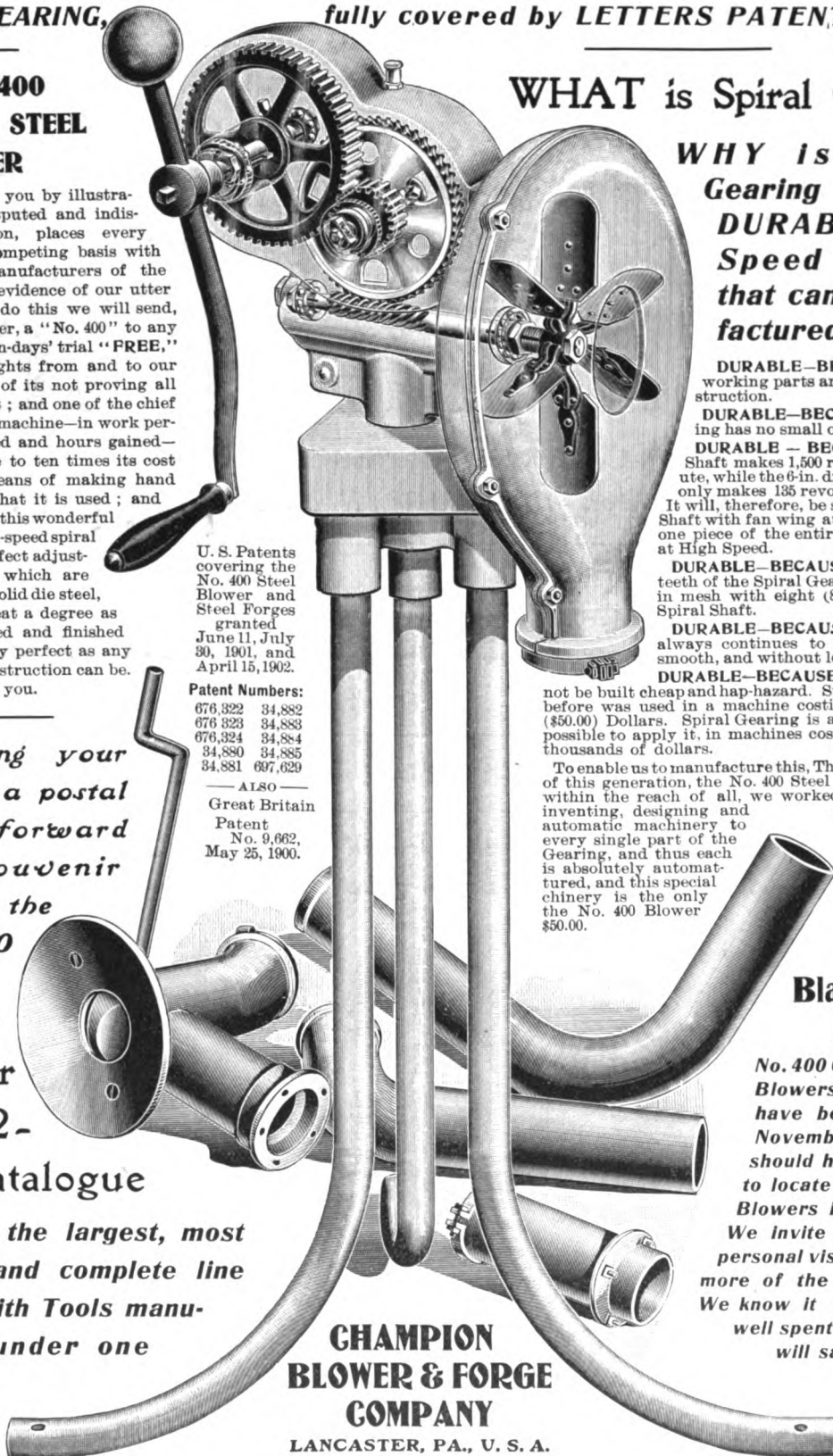
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37,000**

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**CHAMPION
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You Are *ALL* RIGHT When you Buy a **PETER WRIGHT**

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Now goes with every

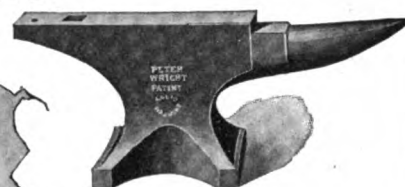
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With Special Steel Face.

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MEDIUM AND HEAVY

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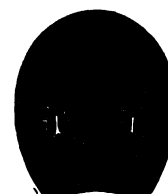
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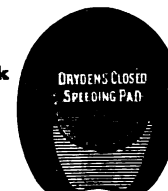
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No Belts, no Clutches, no Ratchets.

The blower case oscillates on its bearing, permitting nose of case to point **down** or **out** or **up**, as may be desired; meeting any **angle** of blow pipe, thereby saving one elbow and 10 per cent. of blast force; besides valuable room occupied by other blowers.

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Small cash payment this Fall and balance next year, or when machine makes the money.

Write at once if interested—

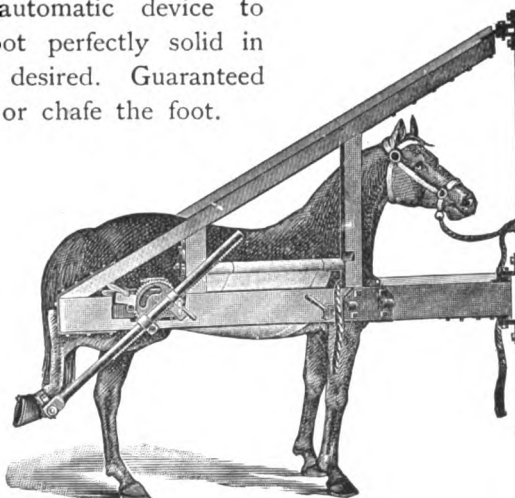
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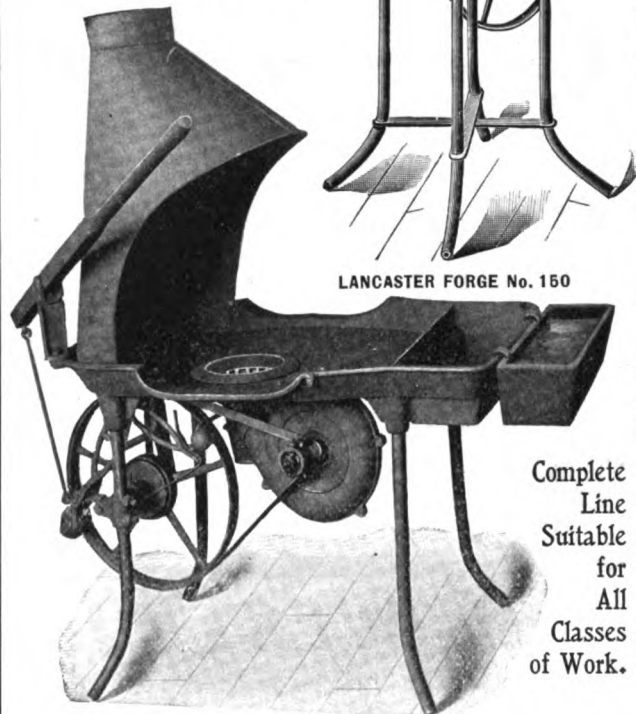
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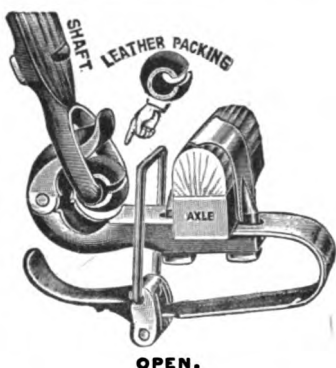
NIAGARA BLOWER No. 450.

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 Works, Lancaster, N. Y.

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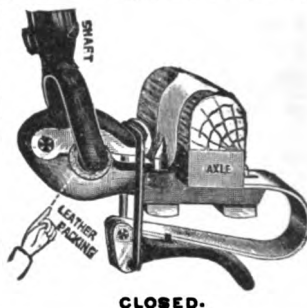
IS a thoroughly practical, quick shifting, ball bearing, and absolutely noiseless Carriage Shaft Coupling, complete in itself, with no loose parts or pieces, and always ready.

ONE HAND IS THE ONLY TOOL REQUIRED TO OPERATE IT.



It automatically takes up its own wear, and with it shafts and pole may be exchanged in 10 Seconds. It is made entirely of Steel, and will out-wear any vehicle to which it is attached. It has been on the market 10 years, and there are over 500,000 Pairs of them in use. The best carriage-makers everywhere use them. Blacksmiths can make a good profit by attaching them to old or new vehicles. Sold by all jobbers in carriage goods. Printed matter free for the asking.

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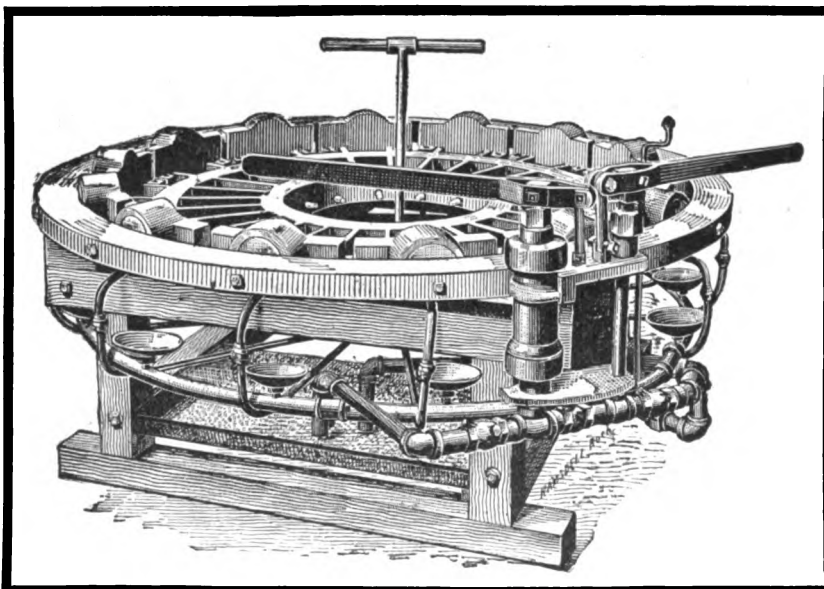
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**IT SETS THE TIRES
COLD.**

It is not necessary to take off old tires or remove bolts when resetting unless wheel needs repairing. Dish can be made just what is desired or necessary, and no more.

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IN A SHORT TIME.**



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IN ONE MINUTE.**

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ROCHESTER, N. Y.



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this sort of thing.
They'll stand up all
right—do their work
in comfort,—to the
satisfaction of their
owners if you'll
help a little. . . .*

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prevent slipping
absolutely. & They
don't wear smooth
as they wear down.*

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shape of them. &
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them; easy to re-
new them. & You
make a friend of the
owner every time
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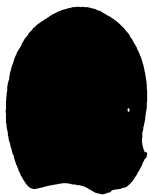
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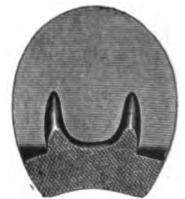
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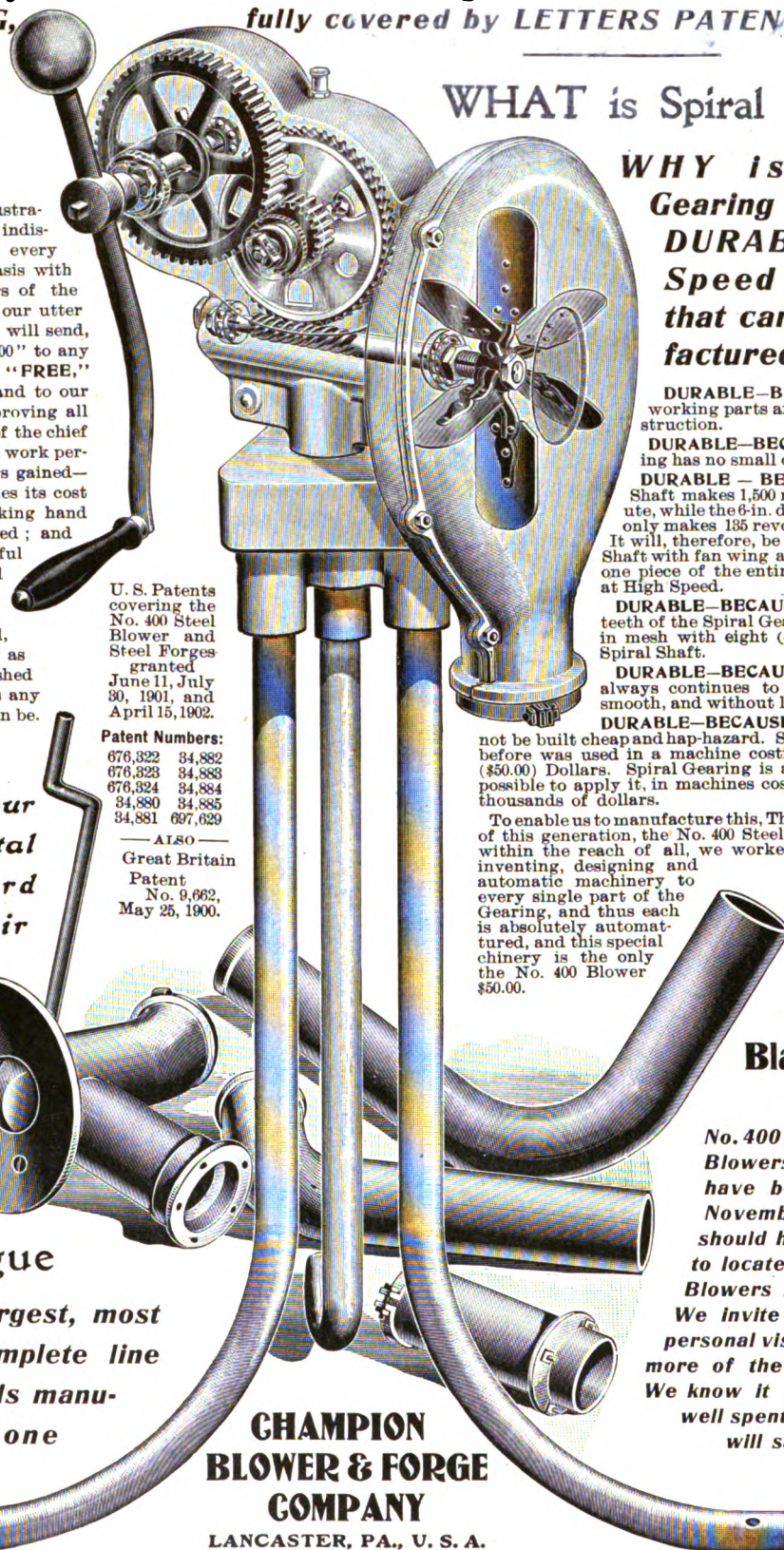
The No. 400 CHAMPION STEEL BLOWER

as we have shown you by illustration and by undisputed and indisputable declaration, places every blacksmith on a competing basis with the millionaire manufacturers of the world; and as an evidence of our utter faith that it will do this we will send, through your jobber, a "No. 400" to any blacksmith on a ten-days' trial "FREE," we to pay all freights from and to our works in the event of its not proving all that we claim for it; and one of the chief claims is that this machine—in work performed, labor saved and hours gained—will save from five to ten times its cost over any other means of making hand blast, every year that it is used; and the chief reason for this wonderful work lies in the high-speed spiral gearing and the perfect adjustable ball-bearings, which are lathe-turned from solid die steel, hardened to as great a degree as can be and polished and finished until it is as nearly perfect as any thing of human construction can be. Our offer is before you.

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U. S. Patents covering the No. 400 Steel Blower and Steel Forges granted June 11, July 30, 1901, and April 15, 1902.

Patent Numbers:
676,322 34,882
676,323 34,883
676,324 34,884
34,880 34,885
34,881 697,629

— ALSO —
Great Britain Patent No. 9,662, May 25, 1900.

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WHY is Spiral Gearing the Only DURABLE High Speed Gearing that can be Manufactured?

DURABLE—BECAUSE it has less working parts and is simpler in construction.

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37,000**

No. 400 Champion Steel Blowers and Forges have been sold since November, 1899. You should have no trouble to locate a few No. 400 Blowers in any section. We invite you to make a personal visit to any one or more of the 37,000 users. We know it would be time well spent. What a user will say means more than if we wrote volumes.

**CHAMPION
BLOWER & FORGE
COMPANY**

LANCASTER, PA., U. S. A.

AMERICA'S BEST Buffalo Portable Blower No. 99

The Most Improved and Powerful Hand Blower Made



Its simplicity of design and durability of construction has made the Buffalo Blower a leader. *✓ ✓ ✓* The blower is supported on a rigid, cast iron standard, and so fastened as to allow the mouth of the blower to be turned to any angle of discharge. *✓ ✓ ✓ ✓ ✓*

OUR GUARANTEE

The Guarantee of the Buffalo Forge Company has always been: If any Blower or Forge is not as represented and perfectly satisfactory, return at our expense. That is why they have always been recognized as the standard of the world.

Your Dealer will send one on trial if desired—Ask him.

**No Complicated Machinery
to Get Out of Order**

Don't be deceived by illuminated advertisements; ask any millwright or machinist about wear of spiral gears—we don't use them.

Buffalo Blowers are built with machine cut gears enclosed in a dust-proof frame. The frame is made perfectly tight so that the oil may be maintained at the bottom of the case. In this the largest of the gear wheels constantly revolves, throwing the oil thoroughly over the parts and affording ample lubrication to all bearing surfaces.

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No Belts, no Clutches, no Ratchets.

The blower case oscillates on its bearing, permitting nose of case to point **down** or **out** or **up**, as may be desired; meeting any angle of blow pipe, thereby saving one elbow and 10 per cent. of blast force; besides valuable room occupied by other blowers.

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The gears are Phosphor Bronze and Steel, cut on the most scientific principle; they are **flat**, and **straight cut** (no spiral or worm gears); which combined with Steel Shafts and Composition Bearings made and assembled perfectly, run noiseless, and makes this the best blower in the world.

The Gear Case is oil tight and dust proof, permitting gears to run in a bath of oil.

The Blast is very powerful, and as positive and steady as a power blower, and takes less labor to operate than others. The after blast is strong and

lasting.

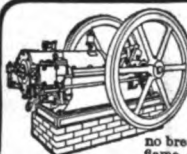
The Column Stand and Iron Base give a solid, non-trembling foundation.

The room it takes is less than any other blower.

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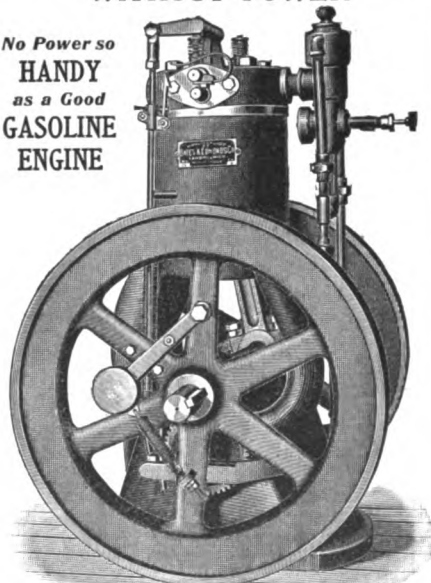
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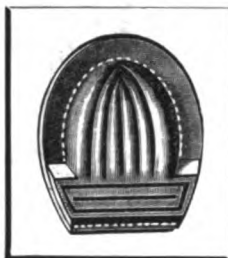
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THE AMERICAN BLACKSMITH

A PRACTICAL JOURNAL OF BLACKSMITHING.

VOLUME 2

NOVEMBER, 1902

NUMBER 2

BUFFALO, N. Y., U. S. A.

Published Monthly at The Holland Building, 451-455 Washington Street, Buffalo, N. Y., by the

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Cable address, "BLACKSMITH," Buffalo. Lieber's Code used.

Entered February 12, 1902, as second class mail matter, post office at Buffalo, N. Y., act of Congress of March 3, 1879.

The Winter's Work.

Are you prepared for winter's coming, in your shop, that is? Or will the flying snow take you unawares? It is always a good plan to provide in advance for a season's work. Perhaps the time has come to replace some of the old tools you have been managing to get along with before. Are you prepared for a long run of shoe sharpening? Then there are the sleds and the sleighs which will need repairing. It might repay you to speak to the owners about them now instead of having them all come piling in on you at the last moment when the snow finally sets in.

Handling Repair Work.

The line of repairing coming to the usual general blacksmith shop is, to the smith whose heart is in his work, the most interesting part of his daily labor. Its wide range and very complexity is fascinating in itself, though calling for the exercise of ingenuity and resourcefulness, often of a high degree. No blacksmith should ever turn away a repair job simply because he cannot see his way clear to the end of it the minute it is put before him. Take it and lay it aside for a day or so to think it over.

A little reflection will clear up matters wonderfully, and the mere starting on a job causes its difficulties to dwindle most perceptibly. Undertake and overcome,—such would be a good maxim for the repairman.

The Preservation of Back Numbers.

We believe almost without exception, that the trouble taken to preserve the back numbers of a periodical which prints useful information is labor well spent. It does not always happen that you are interested in the subject-matter of a given article at the time it is first printed, but in times of future need it comes very handy often, to be able to turn to the desired information without delay. Lay your AMERICAN BLACKSMITH away—you may be in a mood to look it over again some rainy evening and pick up some points which you skipped before and which may be helpful to you in the future, if not at the immediate present. An excellent plan is to use a binder for filing them away as they come from month to month, and then at the end of the volume, bind the index away with them so as to be able to refer quickly to anything appearing in the twelve issues of that volume.

The Reader or the Advertiser.

There is one point to which we wish to call the particular attention of our readers. It is the entire absence of what is known as the free "write-up" from the columns of THE AMERICAN BLACKSMITH. These columns are divided into two separate and distinct groups, the reading pages and the advertising pages. The former, twenty in number each issue, we consider as belonging to the readers who have paid their money for the paper, and nothing is inserted in those columns which would not be of direct interest and value to them in their craft. The manufacturer who thinks that "write-ups," descriptions of old tools, or implements at any rate, which are not new and therefore not novel, will be considered in the

light of news, deceives himself more than he does the reader. We aim to keep readers posted upon the new devices of interest to them as they are placed upon the market, and are always glad to publish such descriptions if they possess any elements of novelty, but we will not do this for any considerations of advertising. The advertiser can contract for a portion of the advertising space, and use that as he sees fit, within certain wide limits, but encroachments of advertising upon the reading space will be guarded against, whatever form they take, "write up" or other. The reading pages are for the readers, first, last and always.

The C. B. N. A. Convention at Detroit.

BY D. W. M.

The thirtieth anniversary convention of the Carriage Builders' National Association was held in the city of Detroit, Mich., during the week beginning September 29th. Detroit, with its historical attractions and the warm welcome given by its citizens, proved easily one of the most interesting points ever visited by the C. B. N. A.

The Light Guard Armory, the largest hall suitable for the exhibits of accessory trades, had been enlarged by frame additions, fully doubling the exhibition space; but even this proved too small, and many exhibitors found space in near-by buildings. All the Cleveland exhibitors occupied and filled a large room at the end of the main corridor in the Hotel Cadillac, and a dozen other rooms and parlors were occupied by exhibits from other points. There were also a number at the Hotel Normandie.

The headquarters of the Association and the sessions of the convention were held at Hotel Cadillac. The convention room was large, well lighted and beautiful in its appointments. The sessions began on Tuesday and lasted for three days, occupying the mornings only from 10 to 12. The Mayor of the city gave the Association a right royal welcome in a speech full of cordiality and good

the foundation of system and of all correct calculation is a working draft. Most small shops get along without, and some large ones do. One who has not learned what can be saved by having accurate working drafts has not learned the first principles of economy in running his business. That is a remark that will be sneered at by a good many honest and successful shop proprietors, because they have made a living, paid their bills, and have something left over and feel satisfied. But this feeling of satisfaction is only another name for a species of laziness. The man who gets along without a working draft does so from a desire to avoid the trouble which he thinks a working draft will cost him, or from inability to make one, which means a desire to avoid the trouble of learning how. The man who gets along without it ought to be ashamed to own it, and simply confesses that he does not know how much he has thrown away.

Any one can understand that it costs less to experiment on paper than with wood, iron, and paid labor. If getting one's idea into exact shape is essential to the perfect performance of any piece of work, by all means put it down on paper or blackboard. Many an idea which seemed clear enough at the start will soon show itself impracticable when it is so drawn out that accurate shapes and measurements can be seen.

A young mechanic wanted to turn the front axle of an automobile on a center king bolt, by means of a chain attached to the ends of the axle and passing over a sprocket wheel on the upright shank of the handle. Instead of putting it on paper and demonstrating there whether it would work, he went ahead to make it, and only discovered its impracticability when he had it completed. All his work and material were wasted. You can hardly enter a shop where you will not find someone has not made a mistake in calculation, because he had forgotten to reckon on some factor which a paper draft would have revealed.

If a spring is to be ordered, make a drawing of it just the shape you want it. If an axle, do the same. Always keep patterns of wood plainly marked, so that they may be referred to for the curves of lines of springs, axles, axlebeds, rockers, top-rails, posts, shapes of hubs—everything in which care is demanded and shape is important. Do not entrust these to chalk marks on a blackboard, much less to memory. Always have the wooden pattern, with the reference number stamped on it,

and in addition have the paper draft properly named, numbered, and put away in a clean place. A rack with compartments large enough to hold each draft rolled up is a good plan.

A cleanly made paper draft, showing all the parts, joiners, irons, bolts, screws,



LAMPS ORNAMENTS THE ALEXANDRA GATES,
QUEENS PARK, TORONTO.

etc., of body and gear, will save its cost many times over, and is the foundation of all correct estimating, and the only possible means of correct calculation.

Examples of Some Canadian Ornamental Iron Work.

Three engravings in this issue show some very tasteful pieces of ornamental iron work from the forge of the George B. Meadows Toronto Wire, Iron and Brass Works Company, Limited, to which firm we are indebted for the photographs of the specimens in question. The engraving on page 54 represents a window grill, designed by Architect F. S. Baker of Toronto for the show rooms of the Nordheimer Piano Company of the same city. The frames are of 1 by $\frac{1}{4}$ -inch stock with scrolls of 1 by $\frac{3}{8}$ -inch iron,

combining to form a very pleasing design. Another of the views shows a very handsome piece of gate and fence work, ornamenting one of Toronto's handsome residences, and indicates what the possibilities are in work of this nature.

The third engraving shows the lamps and standard made by the above firm for the Alexandra Gates in Queen's Park, Toronto. These gates were erected to commemorate the visit of the Duke and Duchess of Cornwall to Toronto, and are from designs by Mr. Beckett, of the firm of Chadwick & Beckett, Toronto.

A Good Welding Compound.

HARRY LENHART.

The following recipe was given me by a tramp, who claimed it was patented, but even if it was patented, a man would run no risk in making as much as he wanted for his own use, as long as he did not undertake to sell it:

Twenty parts of pulverized borax and one part subcarbonate of iron. Use the same as borax.

I have repeatedly heated the end of a piece of tool steel almost hot enough to crumble when brought from the fire, put some compound on, taken a welding heat, upset and drawn it down to a cold chisel edge, and it stands the work as well as an unburnt piece. I very seldom need any compound for welding iron, but if I do, I use the plain borax.

Jobbing Paint Shop vs. Factory Paint Shop Results.

M. C. HILICK.

Readers of THE AMERICAN BLACKSMITH, and others, have at various times expressed anxiety to know how the jobbing shop painter can succeed in making his work stand and look as well as the factory carriage painter. To make the surface painted and finished in the jobbing shop wear as durably as that painted and finished in the factory should prove an easy task for the painter versed thoroughly in all the intricacies of the trade. To make the surface look as mirror-like and brilliant is not so easy.

Good materials, plenty of time for each coat to dry, and a rigid observance of certain plain rules of trade practice, will develop a painted and finished surface, that under ordinary conditions of service should hold fast and wear tenaciously. This same surface, however, may in respect to depth and brilliancy of finish, in freedom from blemishes, dirt motes, etc., prove far inferior to the factory-finished vehicle. A different turn

of skill, the touch of a real artist's hand, is necessary to develop the matchless and mirror-like surface fresh from the factory of repute. In the factory, every process from priming the wood to applying the final coat of varnish is accomplished by a specialist, a mechanic who does one particular branch of the work, and only one. As an example, A colors the carriage body, B applies the first coat of rubbing varnish, C rubs the body out of varnish, D stripes it, if striping is in order, E flows the second coat of rubbing, F the third coat of rubbing, if a third coat is in order, and G finishes the job. So the various processes are divided among various mechanics. These people become very expert in their specialties. Skill, tools and materials fit the work to a nicety, and with the precision of the rigidly-disciplined soldier, each painter of the factory is able to maintain a certain daily standard of results. He works in clean apartments, warmed to a certain temperature, ventilated with especial reference to his requirements, and all contributing agencies are the very best to be had.

To successfully compete, in the matter of surface perfection and elegance, with the factory mechanic, equipped and fortified as above, is a well-nigh impossible task for the many-sided and oftentimes much harrassed jobbing shop painter to undertake. How he can, in some measure at least, approach the high average of the factory painter and finisher, let us herewith briefly attempt to see.

Good materials, as we have said, are among the first essentials. Colors of the best depth of lustre, fine in texture, score an important point in favor of surface beauty. The striping of the factory carriage is, as a rule, harmonious and pleasing to the eye. Secure pencils made by some reliable and skilful factory striper, and practice with the view of becoming an accurate and fine straight-line workman. Even a few lines, if perfectly drawn, are telling factors in bringing the surface up to the right finish. Once you have secured a good kit of striping pencils, aim to keep them in proper condition. Keep them carefully greased and laid away,

when not in use, in a dust proof box. The pencils are best kept by laying them, after cleaning and greasing, upon a piece of glass. The hair is thus made to retain its natural shape and elasticity. Mutton and beef tallow, equal parts, is a good pencil preservative.

The handling and application of the rubbing and finishing varnish is probably the most difficult problem, all things considered, that the jobbing shop painter has to deal with. The first and greatest aid is a thoroughly reliable, free-working, fine-flowing, sure-drying varnish, one that is as non-sensitive as it is possible for the cleverest varnish making skill to produce. The highest priced varnish is often the cheapest in the end. To get the mirror-like surface, granting, of course, that the work has been rubbed out of roughstuff

people, in rubbing the varnish. Keep the varnish, both rubbing and finishing, in a warm, dry location, over which the temperature is quite uniform. Have two sets of varnish brushes, one for rubbing and one for finishing. Keep one set in rubbing and one set in finishing varnish. Have an air-tight, dust-proof brush keeper. Maintain the varnish brush equipment absolutely clean. Likewise, chamois skins, sponges, wash brushes and dusters. These are keys to real success in finishing. Keep the varnish room clean, well lighted and fully ventilated. Study some method of ventilation, even if only the commonest sort. Pure air more directly promotes the drying of varnish, and the development of its greatest brilliancy, than other aids with bigger titles.

Then in applying the finishing coat seek to have perfect confidence in your varnish and yourself. Cowardice in the varnish room invites defeat. Go at the work in a bold, free, skilful way. Flow the varnish on in plenty. Cross brush it, then straighten out, and, a uniform depth secured, let the varnish do the rest.



SOME HANDSOME CANADIAN FENCE AND GATE WORK.

absolutely smooth and level, the varnish must be flowed, not brushed, on. At this point the jobbing shop painter is likely to encounter his greatest difficulty. The thin, skimpy coat of varnish, which it is natural for the mechanic not quite confident of his ability to apply, is a sure forerunner of the frail and shallow finish so characteristic of the jobbing paint shop. Depth and fullness of the varnish fabric, with richness and becoming lustre, are common only to heavily flowed on coats of varnish from first to last. On all light carriage bodies, easy to handle, it is advisable, and a usual factory practice, to tip the bodies so they offer a flat, upturned surface, upon which to flow the rubbing varnish coats, except perhaps the last coat of rubbing. Flow one side and one end, and when this has flowed out and set slightly, turn over and flow opposite side and end. In rubbing, do not cut through at any part of the surface. Rub to a clean, uniform depth of film. Use clean sponges, chamois skins, pails, water, etc. Use 00 pulverized pumice stone and perforated blocks of felt, obtainable of the paint supply

How to Weld Steel Axles.

J. GOOGERTY.

Take for instance 1 or 1½-inch axles. First bend them to fit the axle bed piece. Then to get the length, hold the axle in place on the bed piece, and with a piece of chalk, draw a line across both axles. Next take your cutting chisel and one axle, and cut on the line. On the other, cut about ⅝ of an inch longer. This will mark them, so that when they are hot, you can see where to cut them off. Lay them in a clean fire, well rounded up, with an opening in front, and take a fair heat. Take one out and put it on the anvil so the mark will come even with the outer edge of the anvil. Take a thin and sharp hot chisel and cut it off square from one side, upset with the same heat, back up with hand hammer, then turn it over on inside of anvil and scarf with sledge. Draw it to you a little after each blow, working a series of steps when scarfed. Point it sideways and turn up point of scarf a little, forming a cup to hold the compound. Repeat same way with other axle. Then

lay them in the fire with scarfs up, heat slowly until they are at a good red heat, shut off wind and put on some "Cherry Heat" Welding Compound. Then begin to heat slowly until the compound sticks nicely to the scarf, after which turn it over and put on wind till you get a heat. Have your helper take out one and hold it until you get it stuck with a hand hammer. Then come on to it with the sledge. Finish up with a flatter and fit to the axle bed. Axles should be welded with one heat. The same weld can be made by using marble dust, which is cheaper.

The Elements of Blacksmithing.—13.

JOHN L. BACON.

Instructor in Forging, Lewis Institute, Chicago.

Duplicate Work.—Bending Dies.—Jigs.

There is much work in the forge shop which can be done quickly and cheaply with some simple form of jig, particularly so when there are many pieces to be made alike. The bending jigs described here were made for and used under a 200-pound steam hammer, and illustrate the possibilities in that direction.

The bent piece shown at A, Fig. 110, serves as a good example of work that can be done in this way. This was a hook, bent from $\frac{3}{8} \times 1$ -inch stock, to fit around the flange of an "I" beam.

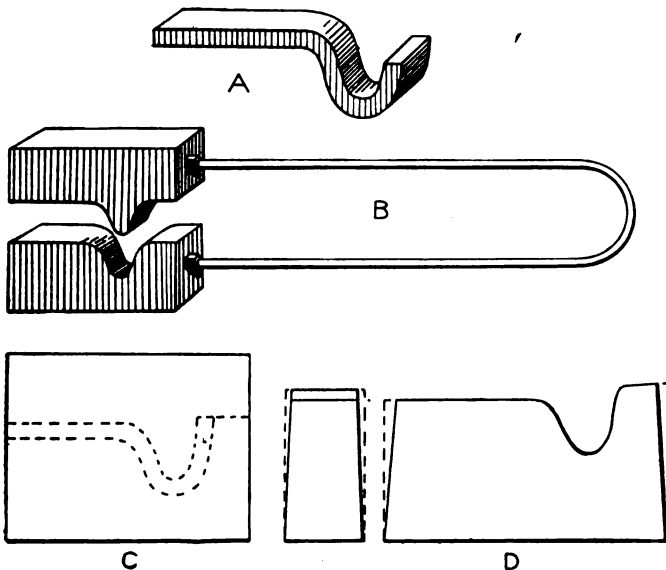


Fig. 110. A BENDING JIG AND HOW IT IS MADE.

The hooks were about 6 inches long when finished. To bend the hooks, two cast iron blocks or dies were used, shown at B. These dies were rough castings, the patterns for which were made by laying out the shape of the hook on a piece of 2-inch white pine block, and then sawing to shape with a band saw. The

sides of the block were first planed smooth, and the laying off was done as shown in C, the sawing being done on the dotted lines. This left the block of such a shape that the space between them, when they were placed together with the upper and lower edges parallel, and just touching each other on the right-hand end, was just equal to the thickness of the stock to be bent. After the blocks were sawed out they were sandpapered slightly to leave them perfectly smooth. When making patterns of this kind, it is a good plan to give them a little "draft." This can be quickly and easily done by planing the sides and ends, after the blocks are sawed out, so they taper slightly, as shown at D, where the dotted lines show the square sides before planing off for draft, as indicated by the solid lines. (The draft as illustrated at D, Fig. 110, is somewhat exaggerated, in order to better illustrate the principle). About one-eighth of an inch per foot is a good allowance for draft.

When the castings were made a $\frac{1}{8}$ -inch hole was drilled in the end of each and tapped to $\frac{1}{2}$ inch. A piece of $\frac{1}{2}$ -inch round iron, about 30 inches long, was threaded for about $1\frac{1}{2}$ inches on each end and bent up to form a handle for the blocks, and locked by screwing nuts up tight, making the finished dies as shown at B, Fig. 110. The handle

was bent in such a shape as to spring the dies far enough apart to allow the iron to be placed between them. There was spring enough in the $\frac{1}{2}$ -inch bar to open the dies automatically between each two blows of the hammer.

When in use the dies were laid on the anvil of the steam hammer, the iron previously cut the proper length, heated, and placed

between them, and one light blow of the hammer would bend into shape. Dies of this kind can be easily and quickly made to cover a variety of work, and are very inexpensive. The dies in question, for instance, required about one-half hour's pattern work and about the same amount of time to fit

the handles. Calculating shop time at fifty cents per hour, castings at five cents per pound, and allowing for the nuts and handles, the entire cost of these dies was less than \$1.25. The

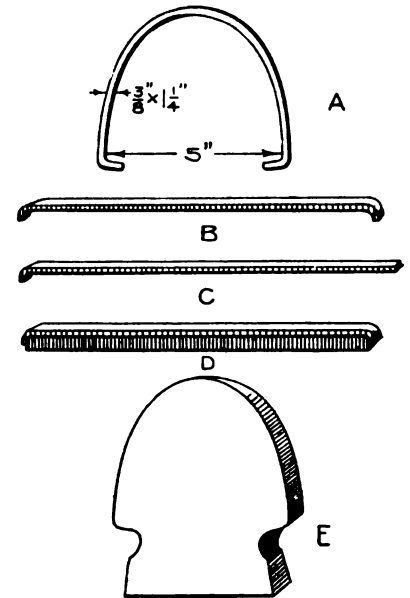


Fig. 111. DIE FOR BENDING A SPECIAL PIECE AND THE PROCESS.

same handles could be used for a number of dies of about the same size, as they are easily screwed off or on. If a die should break it could easily be replaced at a trifling cost. Cast iron dies of this character will bend several hundred pieces and show no signs of giving out, although if slightly defective they may snap at the very first. On an important job it is generally wise to have an extra set of dies cast to replace the first if they should prove defective. Almost any simple shape can be bent in this way, and dies of this kind have the advantage that they can be used on any ordinary steam hammer that has flat forging faces on the hammer and anvil. Not only this, but not requiring to be fastened in place in any way, they may be placed under the hammer or removed without interfering with other work.

For larger work it is often better to have a die that can be fastened in the place of the lower die of the hammer. This can be done by having a dovetail cast on the base of the bending die the same size and shape as the dovetail on the anvil die. A die of this sort was used in bending the piece illustrated at A, Fig. 111. The stock used was cut to the proper length, and the ends bent at right angles, as shown at B. To bend all alike, one end of each piece was first bent like C, in a vise. The other ends were then bent to the same length by hooking the end already bent, over a bar

of proper length and bending down, as shown at D. To make the final bend into the "U" shape, a cast iron form was used like E. This casting was about $2\frac{1}{2}$ inches thick, the dove-tailed base made to fit the slot in the anvil base of the hammer. When the form was used the anvil die was removed and the form substituted in its place.

The strips to be bent were heated and laid on this form, and a heavy piece of flat stock, 1 by 2 inches, bent into a "U" shape to fit the outside of the forging, was placed on top. A light blow of the hammer would force the "U"-shaped piece down, bending the iron into the proper shape. Fig. 112 shows the operation, the dotted lines indicating the position of the pieces before bringing down the hammer. It is not necessary to have the "U"-shaped piece of *exactly* the same shape as the outside of the forging, it being sufficient if the lower ends of the "U" are the proper distance apart. As the strip is bent over the form, it naturally follows the outline, and it is only necessary to force it against the form at the lower points of the sides.

Two large dies are necessary for much work, and if such is the case the upper die can be made to be keyed in place of the hammer die on the ram of the hammer, the dovetail of the bending die being cast the same shape and size as the one on the hammer die.

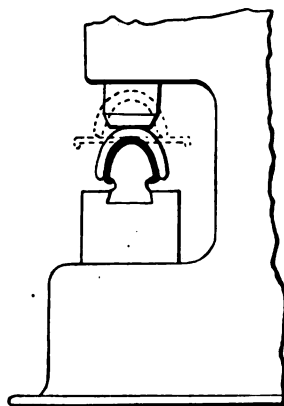


Fig. 112. BENDING WITH DIE UNDER THE HAMMER.

Very convenient tools to have for bending right angles in stock, $\frac{1}{2}$ inch or less in thickness, are shown in Fig. 113. The lower one is made to fit easily over the anvil of the steam hammer, the projecting lips on either side preventing the die from sliding forward or back.

The upper one has a handle attached as described for the dies first mentioned. Both of these bending tools are made of cast iron, the patterns being simply sawed from a 2-inch plank. Cast iron dies of this kind should be made of a tough gray iron rather than the harder white iron, as they are then much less liable to break.

Many of the regular hammer dies, that is, the dies with flat faces for

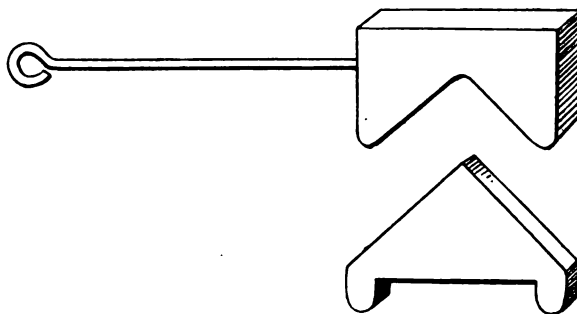


Fig. 113. TOOL FOR BENDING RIGHT ANGLES.

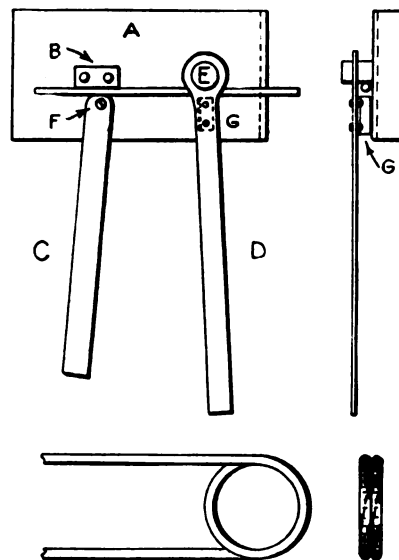
general forging, are made of cast iron. The iron used for them is of another quality, chilled iron, the faces being chilled, or hardened, for a depth of an inch or more.

Much drop forging is done with cast iron dies, and for rough work that is not too heavy they are very satisfactory. The cost is very small as compared with the steel dies for the same purpose. Drop forging can be done in this way with the steam hammer, by keying the dies in place in the dovetail slots made for the upper and lower hammer dies. Welding in particular is done in this way, as the metal to be worked is in such a soft condition that there is little chance of smashing the dies.

Another easily made and very useful tool for coiling small springs, or circular bending of that nature, is the jig, illustrated in Fig. 114, shown with a piece of stock in place ready to be bent. This jig was built up on a base plate A, about $\frac{3}{8}$ inch thick, having one end bent down at right angles for clamping in an ordinary vise. The post E was simply a 1-inch stud screwed into the plate. B was a piece $\frac{3}{8}$ by 1 by 2 inches, riveted into the plate with two $\frac{1}{4}$ -inch rivets, and served as a stop for clamping the stock against, while bending. C was a lever made of a piece of $\frac{3}{8}$ by 1-inch stock, about 10 inches long, having one end ground rounding, as shown. This lever was made to turn on the screw F, threaded into the base plate. D was the bending lever, having a hole punched and forged in the end large

enough to allow the lever to turn loosely on the stud E. On the under side of this lever was riveted a short piece of iron, having one end bent down at right angles. This piece was so placed that the distance between the stud E and the inside face of the bent end, when the lever was in the position shown, was about $\frac{1}{4}$ inch greater than the thickness of the stock to be bent.

In operation, the stock to be bent was placed in the position shown in the sketch, the lever C pulled back to lock it in place and prevent it being pulled forward while being bent, and the bending lever D dropped over it in the position shown. To bend the stock, the lever was pulled around in the direction of the arrow, and as many turns taken as were wanted for the spring, or whatever was being bent. By lifting off the bending lever and unloosening the clamping lever the piece could be slipped up off the stud, and the tool was ready to bend another piece. The jig described above was made for bending cold spring steel wire, about $\frac{1}{8}$ inch in diameter, into the shape shown in Fig. 115. This jig could also be used for hot bending, and could easily be made



Figs. 114 and 115. A COILED SPRING AND TOOL FOR BENDING.

to cover a variety of sizes. For bending different size stock and different circles the only changes that need be made would be to vary the size of the stud E, and change the bending lever D.

(To be concluded.)

Tar Paint as a Wheel Preserver.

J. P. MULRONY.

Tar as a paint for wheels is very valuable for preserving the wood, and is a tire tightener in hot weather. When the tar paint softens by the heat of the sun, it penetrates every pore of

the wood carrying the fine dust with it into every crack and bad joint, and from the squeezing and racking of the joints with these deposits of tar and dust, the cavities are filled solidly with a formation resembling asphalt pavement. This filler becomes set, and is as enduring as the wood saturated with tar paint when first painted. It is slow to set, but if the wheels are run on dusty roads for a few days, the fine dust adheres to the surface, dulls its soft gloss, and forms a scale which gradually sets and thickens.

The tar can be handled pleasantly by first wetting the hands and putting on a thin coat, the tar to be as hot as the bristles of the brush will stand. Spread it thin and repeat every June or July until your wheels are painted and preserved to your satisfaction. In wet weather the tar paint sets, and by striking it with a punch on the spoke, it will crack and fly. Cut into the wood in the wet muddy weather and you will find the wood dry and preserved from the effect of sun and rain. It is a cheap paint, and properly used will dispense with tire setting, and the life of the wheels will be much longer than without it. I recommend its use, and in many instances that I have kept track of, it has given the desired result under hard service. This is a matter of economy and durability. I sometimes, when setting tires, cool them off with water until the tire will not make the wood rim smoke. It is then ready to be hung on a pin, while the rim of the wheel is covered with tar in a pan. Turn slowly, letting the tar drain back until you make the circle of the wheel. This preserves the part of the wheel needed. I get good substantial results from tar paint as a preservative. Tar paint is a very common idea, and in the long run, its effects are commendable.

A Tool For Holding Old Plow Bolts.

C. A. MCCOSH.

The accompanying illustration shows an extremely useful tool which I have made, and which comes in very handy to hold plow bolts when removing



A USEFUL PLOW-BOLT HOLDER.

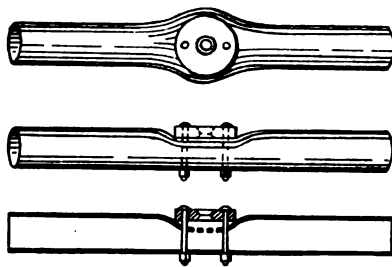
the share. On old plows coming into the shop, the bolts are rusted and turn when you try to remove the nuts. To overcome this difficulty, I took a $\frac{5}{8}$ -inch rod for the lever, and welded a piece of

steel on the point, drawing it to a chisel edge to bear against the bolt head. This lever rod can slide in the ring hook, so that the device will fit any share, old or new. From the figure it will be seen that bearing down on the lever forces the sharp edge tight against the bolt, and securely holds it from turning.

A Home-Made Tuyere Iron.

WILLIAM DUFF.

My plan of making a tuyere iron is to take a piece of two or three-inch gas pipe (boiler flues are even better), long enough to reach two or three inches out on each side of the hearth of forge. Heat it up in the middle, or where the center of chimney comes, lay it on the anvil and hammer until flattened, say for twelve inches. Then drill several $\frac{1}{4}$ -inch holes on the flat side. Get a big cast iron washer with about a $\frac{3}{4}$ -inch hole in the center and ream it out on both sides, so that when the air comes to these holes it will be thrown out as well as up. Two holes in the flange of the washer must be



A HOME-MADE TUYERE IRON.

drilled clear through the pipe to permit its being bolted on. The end of the pipe that slips over the thimble of the bellows may be heated and enlarged on the horn of the anvil, so as to get a better fit on the bellows thimble. In the other end fit a plug of soft wood. If the pipe is flattened down $\frac{5}{8}$ or $\frac{3}{4}$ of an inch deep, it will give plenty of space for the air. When cinders sift down into the pipe, pull out the wooden plug and work the bellows a little, which blows the fine cinders out. You don't need a scraper to remove them. The washer is to protect the pipe and spread the wind.

Repairing Locomotive Frames.

The work of repairing engine frames without removing them from under the heavy structures in the Pennsylvania Railroad shops at Sunbury, Pa., under the direction of the foreman of the blacksmith department, Mr. C. A. Sensenbach, is a striking feature of the work at those shops, and Mr. Sensebach

with several assistants are doing some fine work in this line.

Engine No. 3068 was in a slight wreck, and had both frames bent and the front end on the right side broken off. The next morning, Foreman Sensenbach with several assistants started to work on the job. In five hours he had the frames straightened, a new front shoe welded on, and the engine was ready for duty by six o'clock the same evening. This is fast work, and was a saving of several hundred dollars for the company over the old way of doing this work, by removing the frames from under the engine.

Engine No. 1781 was sent to the shops with the front frame on the left side broken off between the two pedestal legs. This was a bad break, and was at a place where the frame was $4\frac{1}{2}$ by 4 inches thick. A furnace was built around the frame the same evening, and the next morning the blast was turned on and in fifty-five minutes the heat was taken. By the use of a pair of clamps around the pedestal legs and a heavy ram, which was used by several men at the rear end of the engine, the weld was made in five minutes, and was a perfect success. This completed the job in the remarkably short time of one hour. This is the twenty-fifth engine that has been repaired at the Sunbury shops in this way.

The Power-Driven Shop.

BILLY BUNTZ.

For the benefit of those smiths who are thinking of equipping their machines with power feed, I here give the practical experience of a few smiths who are running their shop with an engine.

In the shop of W. L. Paul, of Davis, N. C., who is manufacturing brackets, balustrades, oyster tongs, etc., the $1\frac{1}{2}$ -inch line shaft, 48 feet long, runs down the center of the shop, and drives a wood lathe, planer, rip saw, blower, drill, and two grind stones. The $2\frac{1}{2}$ -horsepower engine is located in a small closed engine room in the center of one side of the shop, and drives the line shaft at 300 revolutions per minute. Mr. Paul says that nearly all of the machines are of his own make, and that since putting in power he has increased his trade quite a little, and expects to have all he can do.

Mr. O. O. Goodenow, Portis, Kan., who is engaged in blacksmithing and wagon-making, has a three-horsepower horizontal gas engine. He says his engine pulls the trip hammer, double emery

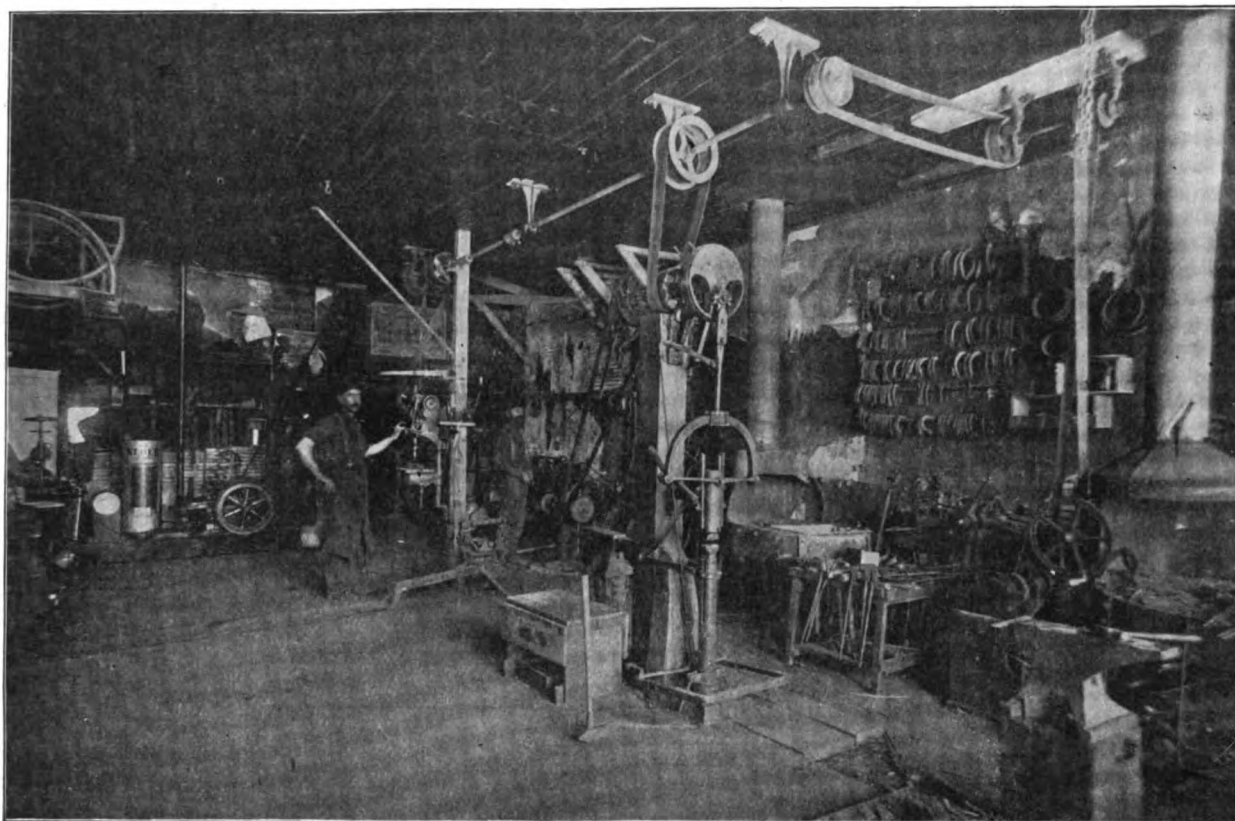
wheel and grindstone with ease, with a man working at each machine. In addition to these machines, a blower is also driven. An eight-inch pulley on the engine belted to one of the same size on the shaft, gives 375 revolutions per minute to the latter. A three-inch pulley on the line shaft belts to a ten-inch pulley on the grindstone. A 36-inch line shaft pulley drives a four-inch pulley on the emery wheel; a 24-inch pulley drives a three-inch blower pulley.

The smith shop of Ben Shopenski, Ashley, Ill., who is making a specialty of repairing wagons, buggies and machinery, contains a number of different

Waugh & Modlin, Esbon, Kan., are engaged in general blacksmithing, and are also manufacturers of a well-boring machine. The front of the shop is used for shoeing and blacksmithing, and the rear for bench work, while the machines are in the middle. The machines, which are arranged for driving by the three-horsepower engine, are a disc sharpener, rip, cross-cut and tank saws, drill, power hammer, grindstone, emery wheel and feed mill. The engine has a pulley on either side of it, one being used for running the feed mill. It could also be used for running a wood saw. The line shaft makes 350 revolu-

same time and have plenty of power.

As to the use of engines for driving feed mills, the experience of the following smiths is of interest: Mr. C. R. Haymond, of Burdett, Kansas, states that he is using a three-horsepower gasoline engine for running a five-inch buhr full capacity, and says he finds the engine easy of manipulation, in fact, simplicity itself. Mr. J. T. Smith of Vliets, Kansas, has a similar outfit, and is grinding about fifteen bushels of chop an hour. His grinder has a nine-inch buhr. "I am grinding from eighteen to twenty bushels an hour," says Mr. Bentley Carr of Basehor, Kan.



INTERIOR VIEW OF BLACKSMITH SHOP OF FRANK DAVIS, BELOIT, KANSAS, SHOWING GASOLINE ENGINE AND LINE SHAFT ARRANGEMENT.

machines driven by a 2½-horsepower Weber gasoline engine. These are a No. 3 drill press, made by the Silver Manufacturing Company, Salem, Ohio, an emery wheel, power hammer, and a 16-inch blower, made by the Buffalo Forge Company, Buffalo, N. Y. Also a grindstone, six-foot Star iron lathe, made by the Seneca Falls Manufacturing Company, Seneca Falls, N. Y.; a circular saw, a buzz saw and a spoke tenoning machine, made by Dole and Deming. In this shop a shaft, fourteen feet long and 1½ inches in diameter, runs along the short end of the room, and drives by means of a bevel gear a twenty-foot shaft of the same diameter, running down the long side of the shop.

tions a minute, but the speed is considerably reduced when all of the machines are switched in. These gentlemen think there is nothing better than a gas engine for the smith shop.

The half-tone engraving shows the blacksmith shop of Frank Davis, Beloit, Kan. The line shaft is 28 feet long, and drives a Bailey drill and a home-made trip hammer; also two countershafts, one of which runs an emery wheel and an eight-foot lathe, the other a blower. Near the engine, which is a three-horsepower Weber, running on gasoline, is a pulley pump on a 33-foot well. The rear of shop is partitioned for wood-working. Mr. Davis says that he and his helper work at the machines at the

A 2½-horsepower engine is pulling his mill. Mr. A. Leas of Rossville, Iowa, has about the same outfit as Mr. Smith, and says he runs his mill and corn sheller at the same time.

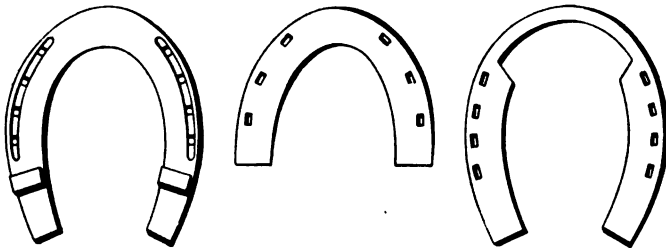
Corns, Contraction and Forging.

A. J. MCDANIEL.

A corn in a horse's foot is a bruise of the sensitive secreting sole, caused often by contraction of the foot. The question, is how to cure them. I never dig out a corn unless it has gathered, and then I make a very small hole with the small blade of a pocket knife, or a small bit, ⅛ or ⅙ of an inch, and let the matter out. I use a shoe, as shown in Fig. 1, with calks welded in front of

the corn. Never cut a corn out to the quick, for it leaves the wall without a support. I have found this simple treatment a success. Many shoers and good ones, too, advocate digging to the bottom of a corn, but that seems wrong to me. The foot is weakened to a great extent, for it needs the part that is cut out to hold the wall in place, and when a corn is cut out, generally the frog bar is cut into.

I have had quite a success with the following treatment for contraction: If the horse is used every day, I shoe with a bar shoe, as that holds the wall of the foot out and gives frog pressure. If convenient for the horse to be turned out and not used, it is best then to shoe him with tips; three nails on each side is sufficient. The tip is made to extend about two-thirds from the toe to the heel, tapered to the heel, and must be thin so that it will not make the horse lame. This shoe is shown in Fig. 2.



Figs. 1, 2 and 3. SHOES FOR CORNS, CONTRACTION AND FORGING.

I have had considerable success with a simple method of shoeing for forging. I make the hind shoes with a short roll at the toe. I make the front shoes as shown in Fig. 3. A great many good shoers make the hind shoes square at the toe, set them back, and then the hoof hits instead of the shoe, wearing the hoof down to the quick sometimes. If a horse does not forge badly a concave roll at the toe will stop it.

I object to calks except in icy weather, or in case they are required on working horses. Where the calks rest on the heel it makes the foot very hard, and will finally injure the foot of the horse constantly on the road and make him lame. A shoer should never use a pressed nail, for in driving it will split and prick the horse. He should use the hot forged nail.

The Railroad Blacksmith Shop.—2.

Rockers and Rocker Arms.

W. B. REID.

In some contract and railroad shops, rockers are sometimes forged in two halves, in dies under steam hammer, and welded afterwards in the centre of

the shaft, as at Fig. 10, A. Our experience of this method has been unsatisfactory. It places a weld at the point of greatest strain in rocker. In a railroad shop known to the writer, a large number of rockers of this description were "scrapped," from time to time, fractured at the point of weld. The fracture, in every instance, showed clearly the conformation of the original male and female scarfs, into which the oil had slowly found its way, effecting their disruption as stated. While this might be attributed to inferior workmanship in the first place, due probably to the slender margin of piece work prices, still, the weight and unwieldy shape of the rocker itself, rendering quick and thorough manipulation difficult, argues strongly against this method of making rockers.

Another equally questionable method is the welding of rocker shaft, dab-scarf fashion, directly into an arm forged full length for the purpose, as in Fig. 10, B. In repairing rockers made in this way, we frequently have the parts fall apart at original weld. Could this weld be made under the steam

hammer in a die having a sunken impression of arm, the scarf in the arm deeply formed with a hole punched clear through its center, the scarf in shaft to correspond, Fig. 10, C, then a substantial weld might be effected. But, where, as in the case of rockers, the entire surface is removed in finishing at the machine, flat dab scarfs driven in with sledges cannot accomplish satisfactory, reliable results. Where no better facilities of manufacture are available, the welded rocker arm may meet all reasonable requirements.

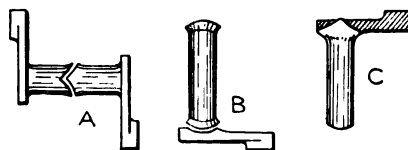


Fig. 10. WELDING ROCKERS AND ARMS.

But positively the best and ultimately the most economical rocker is that made in the solid. In shops provided with reasonable forging facilities, rockers should always be made in this way. At best, a weld is always an uncertain quantity, a weak spot that is very liable to prove troublesome in the day of

future repair. In this respect a rocker made in the solid will prove invulnerable, in service, or in the hands of the smith undergoing repair.

The method of forging is here illustrated. The bending of the arms is the

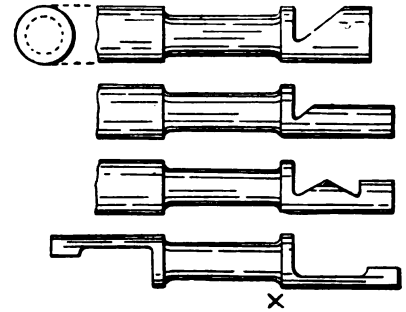


Fig. 11. FORGING A ROCKER FROM THE SOLID.

only real difficulty involved. Where no better means are available they may be bent over the anvil block with sledges; in which case, a good short heat at right place, X, Fig. 11, will render the operation comparatively easy; a long dull heat making it correspondingly laborious. The difficulty, in either case, to be avoided, is the formation of a coldshut inside of the arm at the point of bend. This can only be done by forcing the stock well backwards with a set hammer at the point, X, Fig. 12. If

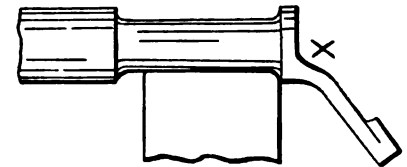


Fig. 12. BENDING THE ARM.

convenient, a ram can be used very effectively in this operation.

This method, at best, will be found of a hard and laborious nature. To overcome this, and to accomplish the work more expeditiously, many tools and appliances for bending arms at the steam hammer have been devised. From their cumbersome shape and weight, however, most of these are unwieldy, requiring a good hammer of considerable stroke for use.

A comparatively light, conveniently made and easily handled tool of this kind is here shown in perspective, Fig. 13. Its construction is simplified as follows: A piece of 9 by 2-inch stock is bent around, as in Fig. 13, A. One side two inches shorter than the other is cut out fork-shaped, Fig. 13, B, large enough to receive the rocker shaft. This forging is then welded roughly to a straight slab of iron of the same size, 9 by 2 inches, Fig. 13, C. In use, this tool is laid across the die of hammer. The rocker

with a good, short heat, at the point of bend, is laid horizontally across the tool, Fig. 14. Two or three small blocks support the rocker, and are removed as the shaft is driven downward.

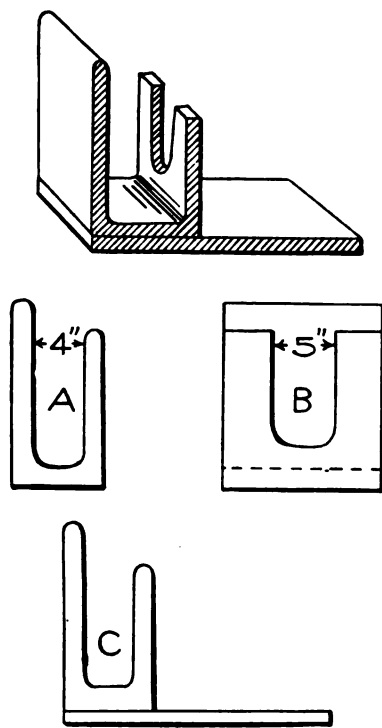


Fig. 13. TOOL FOR BENDING ARMS UNDER THE STEAM HAMMER.

Another block, swage-shaped, of suitable radius, rests upon the rocker shaft at point A, Fig. 14. Light blows upon this block by the steam hammer drives the shaft downwards between the prongs of the fork, thus bending the arm as shown. The fork catches the collar and prevents the shaft slipping backwards.

While this tool does not complete the bending operation perfectly, it does it so as to render completion of rocker

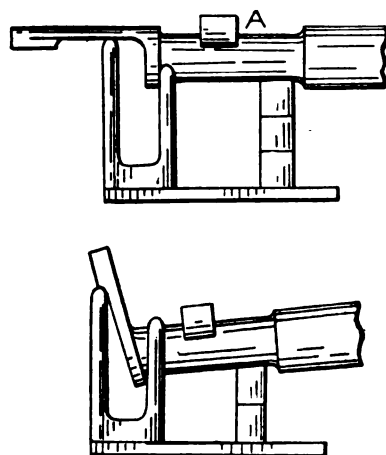


Fig. 14. METHOD OF BENDING.

under the hammer or at the anvil, subsequently, a comparatively easy matter.

Having described some different methods of constructing rocker arms, it will be in order to consider the problems to solve when it comes to repairing broken ones. This will be treated of in the succeeding chapter.

(To be continued.)

A Convenient Mode of Anchoring Posts.

GEORGE NABLO.

Any smith can make the foot irons for posts which I here describe, as they are simple and inexpensive. They obviate the necessity of digging large, deep pits to fasten posts so they will not draw out of the ground when wiring is stretched on them, and so they will not raise by the action of frost, being thus suitable for gate posts, or in fact any posts that are planted. They consist simply of two irons bent at right angles, and spiked to the post. The hole is bored down to the required depth, say two feet, and notched to admit the post with irons attached. When the post thus planted is ready, a lever is fastened to it with a chain, or a cant hook used, and the post given a half turn. Fill in the earth, packing it well around post, and that is all that is required to hold it there for years to come. I use 2 by $\frac{5}{8}$ -inch iron, ten inches in length before bending, allowing the feet to extend about four inches. I also thin the edge on one side, the edge that is to cut the earth, so it will be easier to turn the post. I cannot say how it will work in stony or gravelly soil, but wherever the ground is such that the post can be turned, it will be found highly satisfactory.

The Village Smithy.

The oil painting which is being executed for THE AMERICAN BLACKSMITH by Artist Raphael Beck of Buffalo, New York, has had the finishing touches put upon it. Numbers of our friends who have been in Mr. Beck's studio to look at the picture, pronounce it one of Mr. Beck's finest productions, and hence we count ourselves fortunate in securing this excellent picture for the benefit of our readers throughout the blacksmith world. As mentioned in a former issue, this picture shows the interior of a village blacksmith shop. The central figure is a big, brawny blacksmith, who is engaged in the process of forming a shoe for a horse which stands in the background of the picture. The smith is represented as looking up from his

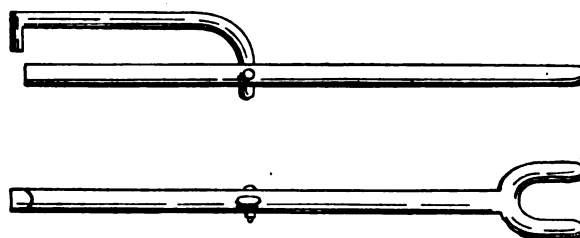
work at a trio of children, who stand in the foreground gazing with evident interest at him, his work and the shop. The whole picture is remarkably true to life, and was painted by Mr. Beck after frequent visits to various blacksmith shops in order that he might be able to faithfully portray such a scene.

It is the intention of THE AMERICAN BLACKSMITH to have "The Village Smithy" copied by the latest duotone process, which gives a remarkably handsome reproduction. As we have before promised, a copy of the picture will be mailed, a Christmas present as it were, to all of our subscribers, and to every person sending \$1.00 to this office between now and January 1st., in payment of his subscription. The picture will be 9 x 12 inches, and will make a handsome one for framing.

Two Useful Devices.

A. W. DUBOIS.

I find exceedingly useful the following device for strengthening buggy tongues: Run a truss rod ($\frac{1}{2}$ -inch iron) from the bolt, just ahead of the double-tree bolt, out through the end of the tongue and cap it with a nut on the end.



A COMBINED BUGGY WRENCH-CLIP.

Then place a bridge two inches high in the center of the tongue, between the tongue and the rod. Tightening the nut will straighten the tongue. We find many buggy tongues that bend down in the center until they are useless, and this arrangement will fix them at a small expense.

I also use a wrench for buggy clips that is very handy, and which may be of some service to others. It is shown by the accompanying figure and will be clearly understood.

Tempering Mill Picks.

EDWARD NORTON.

I have seen numbers of smiths who seemed to think some special process was necessary to temper mill picks successfully. I do not find it so. The only thing I use is water. When dressing the pick, I do not give the steel any higher heat than a red. I temper with a low heat and draw the color to a dark yellow, getting excellent results in this way right along.

The Song of the Forge.

ANONYMOUS.

Olang, clang! the massive anvils ring;
Olang, clang! a hundred hammers swing—
Like the thunder-rattle of a tropic sky,
The mighty blows still multiply—Clang,
clang!

Say, brothers of the dusky brow,
What are you forging now?

Olang, clang! we forge the coulter now—
The coulter of the kindly plough.
Sweet Mary mother, bless our toil!
May its broad furrows still unbind
To genial rains, to sun and wind,
The most benignant soil!

Hurrah! cling, clang—once more what
glows,

Dark brothers of the forge, beneath
The iron tempest of your blows,
The furnace's red breath?
Olang, clang—a burning torrent, clear
And brilliant of bright sparks, is poured
Around, and up in the dusky air,
As our hammers forge the sword.

The sword! a name of dread; yet when
Upon the freeman's thigh 'tis bound—
While for his altar and his hearth,
While for the land that gave him birth,
The war-drums roll, the trumpets
sound—
How sacred is it then.



A Merry Christmas to "our folks."

What blacksmiths advertise locally
and how? Does it pay?

A new painting of note in the art
world—"The Village Smithy," by Ra-
phael Beck.

Bear in mind that we invite you to
ask for articles on any subject you wish
further light upon.

The American blacksmith's motto:
The best work, the highest pay. This ap-
plies alike to the wage earner and the shop
owner.

How about your books? Another year
will soon be ended. Have you collected
all the money due, and paid all your own
honest debts?

Do you agree with all that is said in
the column "Queries, Answers, Notes?"
If not, what are your views upon the par-
ticular subject in question?

There is a shop at Hugo, Jackson County,
Iowa, but no blacksmith to run it. It is a
good site for the right man. For further
information write M. J. Noonan.

Don't talk about the poor work of a
competitor's shop. Let the good jobs
turned out from yours do the advertising
and make him hump for business.

A good trade in the wagon business
exists at Mount Pleasant, Ohio. No one
at present there to take it up. The party
who had this trade before has retired from
business, leaving a very good opening.

An equine shoeing college is to be
started in Flint, Michigan, for the educa-
tion of scientific horseshoers. Saginaw
capital has been invested to some extent
in the project.

Are you busy—shop full of work? Then
make arrangements to be busier. Power,
tools, and improved methods help fatten
the purse if used judiciously—fact, but
Tom Tardy doesn't believe it.

Provide clean, wholesome reading for
your children and family. THE AMERICAN
BLACKSMITH clubs with all standard pub-
lications and can save you money by order-
ing through us. Write for club prices.

Time was when ancient smith shop
methods were tolerated in the large indus-
trial works. Time is when they are not.
Ask the smiths to whom is given the par-
ticular work—the one who draws the fat-
test envelope at the end of the week.

"After reading a copy of your paper,
I find it would be of great interest to me,
as I am a young man in the business and
would like to learn how the different
smiths work. My business is principally
horseshoeing and I would like to find out all
I could about it." So says a wideawake
ambitious smith of Kennet Square, Pa.

A good year's growth should be one's
portion every twelve months. What have
you accomplished since this time last
year? What advances or improvements
in your condition have you made? Not
everyone can be satisfied with the material
progress of a year, but the feeling of
having done one's best is a source of
immense gratification.

How is this for a varied use of the gas
engine and hence a strong recommen-
dation in its favor? R. I. Parkhurst, Am-
herst, N. H., writes that he is using a 2½-
horsepower gas engine, sawing wood, cut-
ting ensilage, running a churn, and also a
threshing machine. Have you thought of
how many different uses there are to which
you yourself could put an engine?

What legislation will be of benefit to
the blacksmith fraternity? Let the sub-
ject have wide expression through these
columns. Then we can get together and
set our Representatives and Senators to
work. That is what they are paid for.
When corporations, manufacturers, farm-
ers and everyone else are getting bills
enacted to help their cause, why shouldn't
we?

Secrets of the jury room do not often
leak out, but one came to our ears the
other day. A horseshoer, who conducts
an orderly and business-like shop, by his
sound reasoning turned the entire opinion
of a jury on which he was serving in an
important criminal case. The high com-
pliment paid to the jury by the Supreme
Court judge for the verdict rendered was
due to the horseshoer personally.

It is often difficult when welding iron or
steel to prevent the flux from melting and
running off the weld. To obviate this
difficulty a flux has recently been devised
consisting of a borax compound in which
a fine netting is incorporated to hold it

together. It is rolled out into fine sheets
and separated into squares which may be
easily torn apart for use. Recent tests of
the flux shows a very high efficiency to
the weld, the flux being held in place and
performing the function of covering the
surfaces of the weld very perfectly.

Figure out the weight which a large
dray horse must lift in the course of a
long day's work with excessively heavy
shoes on his feet. The energy consumed
in raising these heavy masses of metal,
aggravated as they often are by rubber or
leather pads, amounts to a considerable
figure. Such weight is especially trying
to the animal in hot weather. The pri-
mary function of the shoe is simply to
protect the hoof from too rapid wear, and
shoes should be made as light as practic-
able. Lighter shoes and more frequent
shoeing should be the rule.

A reward for your effort. THE AMERI-
CAN BLACKSMITH does not believe in work
without pay. Following our conviction,
we offer a good reward for a little effort
expended in getting new subscribers for
us. Look over the premium offers in our
advertising pages. We do not offer pre-
miums for renewal subscriptions, to keep
our present friends, so to speak. Our idea
is to get those who don't understand how
much help a paper like THE AMERICAN
BLACKSMITH would be to them, to try it
for a year. We are willing to stand a loss
on the first year's subscription, for we be-
lieve that once a reader, always a reader,
applies to our subscribers.

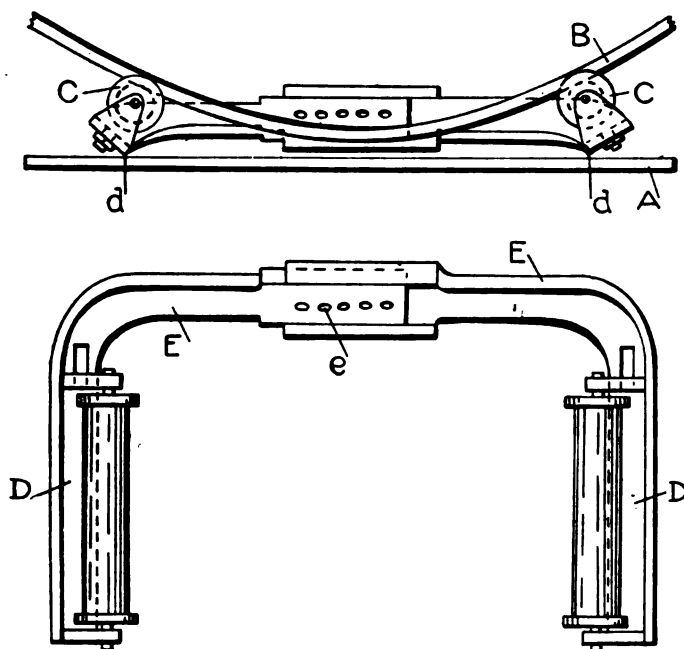
Tom Tardy's shop is not a tidy shop.
When we stopped in there this morning
to pass the time of day, we had to scram-
ble over numerous heaps of scrap and
rubbish to reach our friend. Tom believes
time spent in straightening up is just so
much time lost. When asked what was
in a big rubbish pile over in a dark, far
corner, Tom said he didn't know, as he
hadn't seen the bottom of it for more
than a year. Why didn't he clean it out?
Didn't have time. Yes, he had closed his
shop at noon the day before, but then
Tom explained that a man must have
some relaxation, so he had shut up shop
and gone to the races.

A recent visit to a blacksmith shop by a
representative of THE AMERICAN BLACK-
SMITH revealed a very peculiar state of af-
fairs existing there. Of course we can
mention neither name nor place. It seems
that the foreman of this large shop, having
under him a great many smiths, young
and old, was himself a subscriber to THE
AMERICAN BLACKSMITH, and outside of
the shop read the paper regularly. He
was, however, unwilling to allow any of
his men to see or know of the paper. He
was apparently fearful of having his men
obtain any new information, perhaps be-
cause he lacked it himself. Such cases
but rarely come to our notice. The fore-
man blacksmith who has any regard for
the standing of his craft will not frown
upon any attempt of the men under him
to obtain a fuller knowledge of their trade,
but will aid in every possible manner any
increase of the knowledge on the part of
his subordinates. Such is the typical mas-
ter blacksmith, the kind we usually met.

A Support for Wheel Tires.

J. S. DUQUETTE.

The accompanying drawings show a support for wheel tires recently invented by me, the object being to hold



A USEFUL DEVICE FOR SUPPORTING TIRES WHILE HEATING.

the tire while it is being heated in the fire on a blacksmith's hearth. Referring to the drawing, A represents the top plate of the hearth, and B a portion of the tire which is being heated. In order that the tire may be rolled on its axis over the fire, it is supported on two flanged rollers C, which are journaled in brackets D. These are arranged at an angle so that one edge only, as D, rests on the hearth. This sharp edge prevents slipping on the plate and no cinders can lodge underneath it. The arms holding the rollers are curved, one of them being provided with a dovetailed socket in which the other arm is slidable. The slidable arm is provided with a series of holes and the other arm with a catch for engaging these holes, preventing the slipping of part of the arms after being properly adjusted.

This device is simple, and will be found very useful to those who have considerable tire work to do.

Examples of Die Forgings.

BY RAM. ENGLAND.

In the accompanying examples of die forgings there is a similarity, and in the articles illustrated by Figures 1 and 4 a sameness in the method of manipulation. Fig. 1, A, is plan and elevation of a ring plate. The usual way of making this is to make the eye and scarf it, and then by means of a dab weld

attach it to the plate in its proper position. A cheaper, quicker, and more reliable way is the following, assuming there are a quantity to be made: Make a steel block (See Fig. 1, B, for plan and section.) Then take a piece of iron $2\frac{1}{2}$ inches in diameter, by about 5 inches long, and flatten a portion of one end as illustrated in Fig. 1, C. By placing a $\frac{3}{8}$ -inch plate on the bottom hammer block, the correct thickness is assured, and they can be thus shaped as rapidly as conveyance from the furnace to the hammer will allow. Next put them back in the furnace, and bring them to a

good welding heat, taking care not to burn the flattened portion off, and stamp them in block B. A little oil or water placed on the block will be an advantage. There will be a thin fin all round the article, which is readily cut or sheared off; it will also leave a corner at M, Fig. 1, A, which will require cutting off, and cleaning up. You have thus a good, clean, sound and cheap job.

I make the article illustrated in Fig. 2 much the same way, only in this case I use stock 2 by 1 inch, of a convenient hand length. I draw about two inches of the end down from 1 to $\frac{5}{8}$ inches, and then heat it in the fire the required length. Holding it edgewise on the die block, the flattened end will thus form the eye, and the thick part of the stock makes the plate.

In the case of Fig. 3, an eye plate, we have a more difficult article to

forge. I make these from scrap bars drawn down to about $4\frac{1}{2}$ by $4\frac{1}{2}$ by 6 inches (one bar cuts several). I next heat these to the welding point, and hold them endways over the block, Fig. 3, B, and let the hammer beat them down to about $1\frac{1}{4}$ inches thick; by this time the slot $2\frac{7}{8}$ inches deep is nearly filled up. Then take a second welding

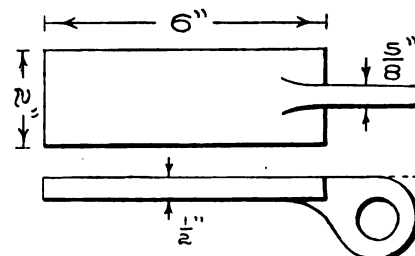


Fig. 2. EXAMPLE OF DIE FORGING.

heat and repeat the process, stopping the hammer when the plate is the required thickness. The block, Fig. 3, B, is chamfered off all round, to allow the surplus stock to get away, otherwise there would be some difficulty in getting them thin enough. In this case, the article is all that could be desired. When sheared and drilled it is ready for use.

In the above cases, the die blocks can be forged nearly to shape, so that very little chipping is required. As there is a similarity in each, I will only explain my method with regard to one,

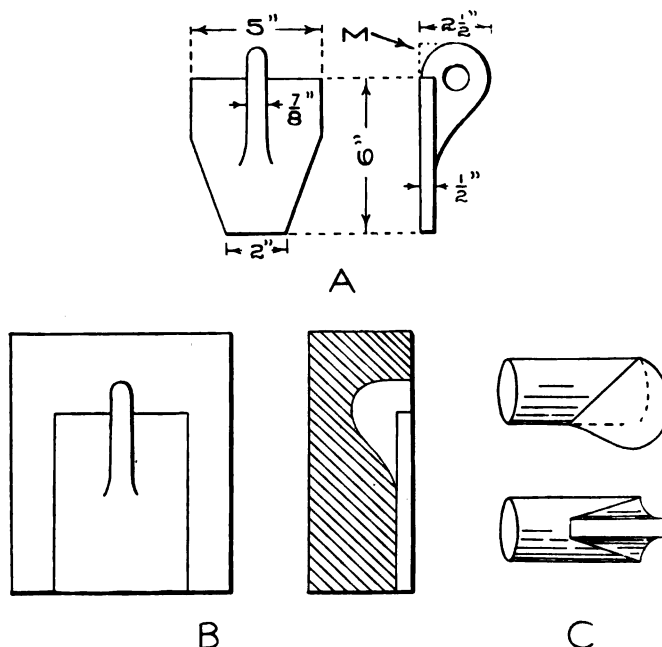


Fig. 1. RING PLATE AND METHOD OF FORGING.

say Fig. 1, B. I take a piece of steel, $2\frac{1}{2}$ by $\frac{7}{8}$ by $3\frac{1}{2}$ inches, cut the corners off one end with a set, and make it the required radius each way. Next forge the steel block 10 by 8 by 4 inches, and

while it is quite hot drive the rounded end of the punch into it to the required point $2\frac{1}{2}$ inches, thus leaving one inch projecting. A few light blows on each corner of the piece will loosen this so that it can be pulled out with the tongs. Then I take a plate, say $4\frac{3}{4}$ by

third that of coal, and the output of work very much greater. I should say that we can do about as much work again with oil as we could with coal, as it heats much quicker and makes the iron better than it would be if worked with coal.

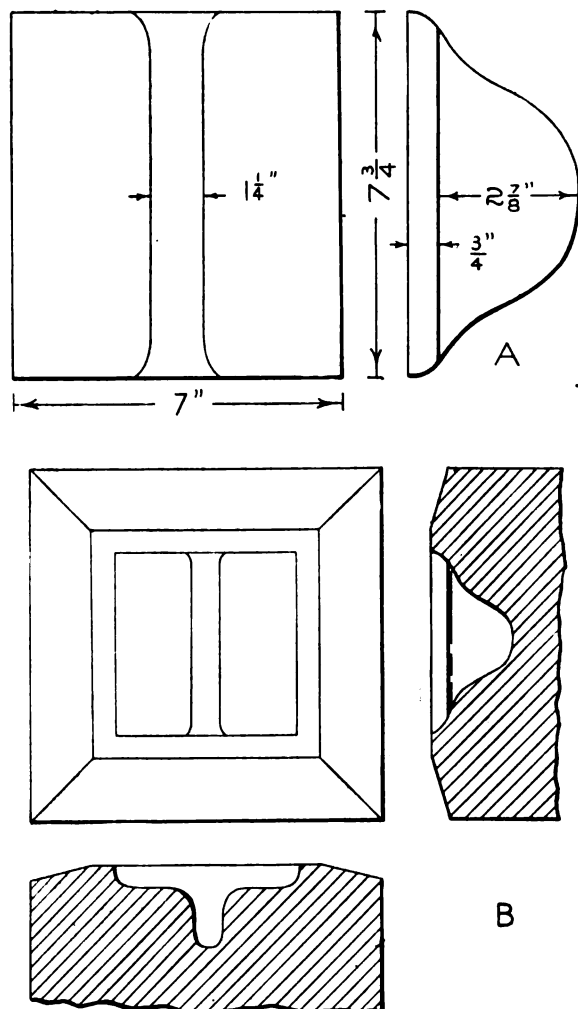


Fig. 3. EYE PLATE AND DIE FOR SHAPING IT.

$\frac{3}{8}$ inches, and any length, place on the hot piece, so that one end stands half way over the imprint already made (taking care that the one is parallel with the other), and beat it down level. It only takes a little fitting or chipping to complete the tool.

In the case of Fig. 3, B, I use an eye-plate for this purpose. It is advisable in each instance to slightly harden the blocks when complete. The sketches of Fig. 3, B, are from a cast iron block which I use under a 2,000-pound hammer.

The Oil Furnace.—Best Form.

Papers read before the National Railroad Master Blacksmiths' Convention.

Paper by J. G. Jordan.

I find the use of oil as fuel very satisfactory in turning out the work. The cost of the oil is only about one

We will take for an example the work required for a lot of new cars. With oil as fuel, and using a bulldozer or steam hammer tools for bending all car work, it is very seldom that a piece breaks at the corner, even though the iron is poor in quality. In making up a lot of 4,000 "U" bolts I used to break from 150 to 200 when we used coal for heating, while since we have been making them with oil fuel it is very seldom that we have one to break.

In our bolt furnaces we use water fronts, with two-inch water space. They have a $\frac{3}{8}$ -inch feed pipe at the bottom, and $\frac{3}{4}$ -inch waste pipe at top. The inside space is 7 inches wide 3 feet long and 2 feet high, with a four-inch wall all around. The opening for bolts holds about 150 $\frac{5}{8}$ -inch bolts. We fill this space up with bolts and heat them. The blast and oil are then partly shut off, working the heat off in that way. We make from 3,000 to 3,500 three-

quarter and five-eighth bolts per day on one bolt-header, and the only trouble we have is that of lining up the furnaces on the front about once every two weeks, as, you will understand, where the fire escapes it eats the bricks away in a short time.

For heavier forging or bending we have a heating furnace with no water front. The furnace is 3 feet long in the clear and about 10 inches wide inside, with two ordinary pipe burners, one at each end. The furnace is 24 inches high in the clear inside. We bend all our transoms from this furnace. The iron is 1 by 7 inches, with a double bend on the ends. We put three of them in at a heat, and it takes only three or four minutes to heat it from a cold to a white heat. In this way we bend 160 ends for ten hours' work under

steam hammers, and if we tell the men they can go home after they have completed that many they will go home in about seven hours.

The next furnace I will mention is the spring furnace. This has two burners at the end. It is built on the same style as a scrap furnace, with the stack lined with brick, and with two partition walls every 24 inches, having a double row of holes every four inches—2 by 4-inch openings for the blaze to go through. In the first part from the burner we make our archbars, break levers and all other work commonly made with a bulldozer or a steam hammer. This compartment has a sand bottom. The next compartment is used for spring making, and has a brick bottom. We also do all our case hardening and annealing in it. As the furnace is located in the center of the shop, the door of the spring furnace is on one side and the door of the bulldozer on the other side, which makes it work very nicely, and makes good headway with very little oil—perhaps 50 gallons to each burner in a ten-hour day.

The next furnace is the axle furnace, which is the largest furnace we have. It is located near the center of the shop and is divided into two parts, with one partition wall 24 inches high in the clear, with a door 18 inches square. This furnace has a sand bottom. It has three pipe burners at the end of the furnace near the top. The arch in that part runs across the furnace and is 20 inches high. There are 4-inch openings in this partition wall every four inches all the way across the bottom of the furnace. The blaze goes through these openings and heats up the other part of the furnace. In this second compartment we heat pieces of locomotive tires and make claw-bars, and lining-bars out of it. The heating door to this compartment is placed opposite the axle furnace door, so that men working at one compartment of the furnace do not interfere with those working at the other compartment. There is a hammer and crane on each side of the furnace. We have made about 45 driving axles so far and none of them have yet been returned. Some of them were nine inches in diameter.

The oil is a success in our shop already, and we are learning more about using it for blacksmith work every day. It is only about two years since we first commenced its use in a small way, but we have been gradually increasing its use and have had very satisfactory results from the start.

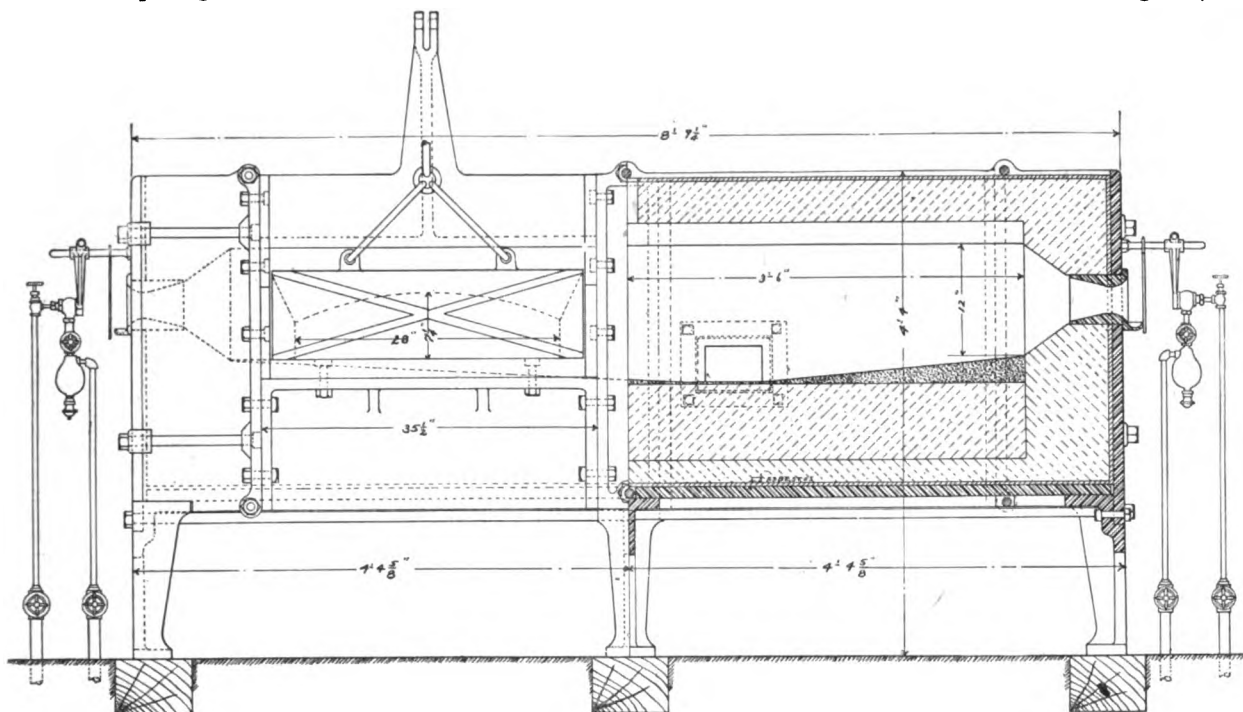
This pretty well covers my experience up to this time, but should I learn anything more of importance in the near future I shall be glad to furnish the Association with the facts.

Paper Read by George Lindsay.

The designs of furnaces are many. There are big ones and little ones. The largest I have seen was at Homestead, used for harveyizing armor plate, which would admit a locomotive into the door of it. The smallest I have seen was for tempering fish hooks.

twenty-five more, when it occurred to me I might try both together. I covered up the fire hole and kept the fan blast as it was, for coke, and made a hole for igniting tube for oil, and it worked first rate; merely stumbled on it; now I feel satisfied at present. But one burner is used, and we are now using this in designs of furnaces, all the other details being right. The conditions around them sometimes determine the style, whether one side or both, or extension so as to utilize all the heat

I believe a great many of the failures with oil furnaces are due to not enough blast. The pressure should be at least 7 or 8 ounces per square inch. The internal lining should be so built that it can be renewed without tearing all the furnace down, avoiding projections that will retard the free course of the flame; easy round curves or bevels are not objectionable to obtain an objective point. These things will suggest themselves to a close observer. There should be a uniform heat throughout, with that



FUEL OIL HEATING FURNACE AT PULLMAN CAR WORKS, PULLMAN, ILL. INSIDE DIMENSIONS, 7' 0" x 18 1/2".

I suppose it will always be that designs of furnaces will vary with the men in charge, and often with the surroundings of them; perfect combustion being the most important aim, and that is sought by some with steam, others with high pressure air and others with fan blast, which should be at least 7 or 8 ounces per square inch. If less and you have a compressor in the plant, mix compressed air with fan blast by spraying the oil with the high pressure. I have not had any experience with steam, but it looks feasible; it will expand more than the compressed air. Mr. Judy informs me he uses it in plate work on pressed steel cars, and speaks well of it. He doesn't require welding heats. Whether he could get them or not I don't know. I, myself, failed to make a success of it with compressed air alone, and being hurried to get some few hundred flues welded I made a few changes and used coke; after the fire was cleaned and all supposed to be done I was again called to get some

made from the oil used. By grouping the forging machines and furnaces, often the surplus heat can be used to advantage.

I show here a number of drawings, very kindly given by Mr. E. Corlson, Pullman Car Works.

Mr. Corlson's furnaces are so arranged he uses compressed air, 80 lbs. per square inch, which he says is better than steam; also more economical, giving better results. One of the furnaces is 7 feet by 18 1/2 inches inside with two burners. The other is smaller, as will be seen by the figure. For the comfort of the operator he has 1/2-inch asbestos outside, and on the smaller one 1/4-inch asbestos. There are many devices for the purpose of holding the heat from the operator; perhaps the water jacket is the most elaborate; but where a double wall is practicable I believe this is the most effective. Another device which is used is a perforated blast pipe in front to throw the heat upward.

soft white flame that every blacksmith knows only by experience. The outward walls of a furnace ought to be substantial and bound together with plates and bolts; it will pay; the less fire clay the better, if a close joint is made.

I believe the general method adopted by all for conveying the oil to the furnace is by gravity, 12 to 14 feet being ample. I have found that forcing the oil if the opening be small will give trouble by stopping up. Where practicable why not heat the oil as well as the blast? The winter weather makes it pretty stiff to flow well.

Paper by H. A. Folk.

Oil as fuel is unsurpassable for heating furnaces, for bolts, springs, flues and all kinds of medium size forging. All car work can be heated with oil far better than with coal or coke.

I can't say how gas would work, but my experience with oil is in the first place a quicker and more uniform heat,

making the iron much softer, pliable and without injury, and the life of a set of steel or cast iron dies is two-thirds longer than with either coke or coal. Iron can be heated in oil that soft in a

should know, just how to build his fire to take a heat just as he desires the heat to be, and if he is not a competent heater he is not a blacksmith, for two-thirds of a blacksmith's job is done in

experienced person, and are readily detected by passing the hand along the cannon.

While lameness even of a serious character is sometimes the result of



ORNAMENTAL IRON GRILL WORK FOR SHOW WINDOWS.

4-inch lineal length of $\frac{3}{4}$ or $\frac{7}{8}$ -inch iron that 2 inches of the end will drop off without wasting the body of the material. In shearing the iron off it will leave a sharp edge on the iron; this sharp edge will not waste away. We do all our springs with oil, and it is far superior to coal or coke for spring making; it can be handled so much better and easier than any other fuel; it is always under control of the operator; simply by the turning of a small valve you can have a great volume of heat or reduce it down to a mere blaze.

We use oil for all our flue welding, and find it far ahead of any other fuel,

the proper heating of his material. If he can't heat he is no mechanic. And it is just so with oil; if your furnace is built right it will heat right, and if not built right it is far worse than no furnace at all; I would tear it down and throw it out and stop the worry.

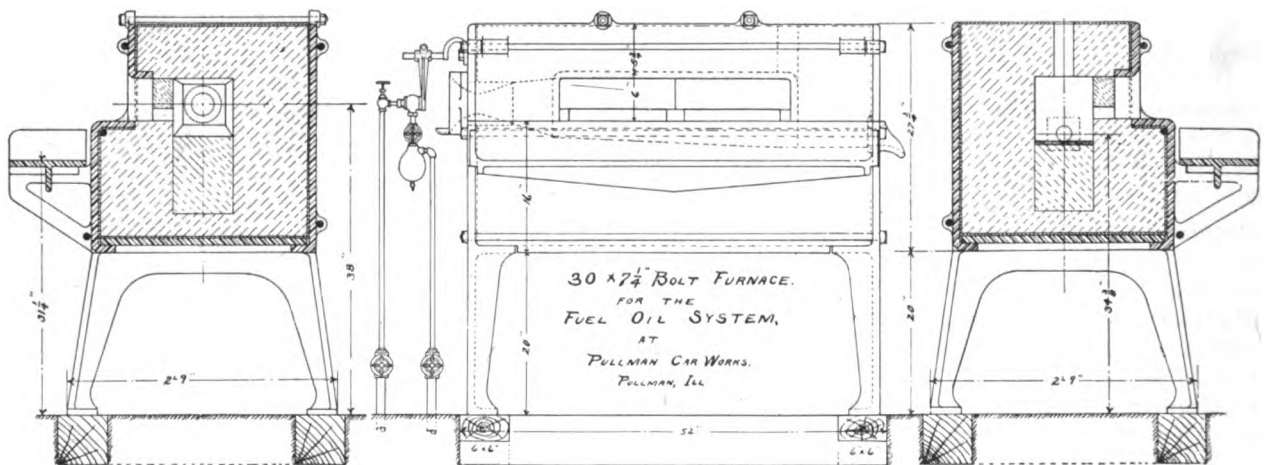
Diseases of the Foot and Their Treatment.—11.

E. MAYHEW MICHENER, V. M. D.

Splints.

By the above name is known the disease of the bones comprising the region of the cannon, or, in other words, the parts situated between the knee of the

splints, yet it is the exception. Very many animals have one or more splints and yet are at no time rendered the least lame thereby. A very high percentage of horses have splints between the ages of three and eight years. Animals older than the last named age frequently show splint enlargements, which have been acquired at an earlier age, and not rarely, these enlargements remain for life. Occasionally, however, an adult animal, or even an aged one, may have a splint form. The most common situation of splints is on the upper third of the inside of the front cannon bones; next in frequency is the



ELEVATION AND SECTIONS OF A SMALL FUEL OIL BOLT FURNACE.

the heat seemingly being so much softer and more pliable than with coal or coke, and no waste of material. We do all our bending of arch bars, carrying irons, truck stays and draft yokes with oil fuel; it saves time, expense and labor; no coal or coke to handle, no ashes to handle, no scoop, shovel, poker or rakes to handle; simply turn on your blast and then your oil, and your heater's hard work is done.

Four-fifths of the advantage in heating with oil is in the general construction of the furnace. If the furnace is not built right the oil will not heat right. Every blacksmith knows, or

front leg and the hock of the hind leg, above, and the fetlock joint, below. Splint formation is characterized by primary inflammation of the periosteum, or covering of the bone, and at times of the bone itself. As a result of the inflammation, the circulation of blood in the inflamed area is increased, and as the periosteum has for its normal function the formation of bone, the increased amount of blood in the inflamed part causes bone formation to proceed to an abnormal degree, and a piling up of bone material is the result. The enlargements are generally circumscribed and visible to the eye of the

outer side of the same bones; the middle third of the cannon is more rarely troubled, and the lower third very rarely so. Splints of the cannon of the hind leg are so rare that many writers do not mention the occurrence at all, yet the condition sometimes does exist.

Not uncommonly splint enlargement is noticed upon both inner and outer sides of the cannon at the same height. In such cases, if there can be detected a band of enlargement connecting the two points, the condition is commonly known as "pegged splint," and is generally considered as liable to cause lameness. If the splint is quite high

and threatens to involve the articulation of the knee joint, the case may be of serious importance. While all splints are strictly an unsoundness, yet only in a small percentage of cases is the condition such as to impair in the least the usefulness of the animal. The presence of splint lameness in an animal past the age of eight years does not, as a rule, offer the most encouraging prospects. The presence of splints upon a stallion or brood-mare may in some instances be an objection to their use as breeding animals, as it is noted that some families of animals seem to be predisposed to splint formation even without any of the recognized existing causes being operative. In judging animals of the above class, the influence of conformation as a cause of splints should receive careful consideration. Animals which have their feet too far apart as well as those of the directly opposite fault are predisposed to splints, on account of the faulty distribution of the body weight upon the limbs.

Causes of Splints.

These may be defined in general as such conditions as lead to the inflammation of the bone of the cannon, or its covering, the periosteum. Direct blows to the bone is sometime a cause. This is sometimes noticed in animals which strike themselves in traveling. The most frequent cause, however, appears to be a laceration of the periosteum along the attachment of the short inter-osseous ligament which binds the small metacarpal bones to the principal or large metacarpal bone. Hard work and fast work on solid or rough roads is a recognized cause of such injury. Bad conformation, as noted above, renders the liability greater. Failure to properly level the foot in shoeing may be a contributing cause, for by this means either the outer or inner side may receive more than its proper proportion of weight.

Splints from direct blows are generally situated well forward, and generally involve the large metacarpal bone alone, while those arising from other causes, commonly are situated at the line of junction between the large metacarpal and one of the small ones, and involve both bones to about equal extent.

Symptoms of Splint Lameness.

Lameness from splint may be noticed before the enlargement has formed to any considerable extent. The amount of lameness varies greatly according to the case. It almost invariably increases

with work or exercise. A marked feature in splint lameness is the fact that the limb is carried outward as it is moved forward in traveling. At the point of injury the usual signs of inflammation are more or less apparent; heat, pain upon pressure, and more or less swelling may be detected.

A word of caution in the diagnosis of lameness is not out of place here, and can be included in the following: Splints are common, splint lameness is *not* common. Do not hasten to name splints as the cause of a case of lameness, until all other possible causes have been excluded.

Treatment of Splints.

In general the prospects of recovery from splint lameness are good, although some few cases are troublesome. In the case of high splint, the new formation of bone may involve the knee either by the inflammation extending to the surface of the knee joint or by the enlargement, limiting the free joint movement, or both. The blemish of the enlargement of splints frequently disappears altogether with nothing whatever done in the way of treatment, and unless there is good reason to apply remedies for the reduction of the enlargement, such procedure is questionable, and is condemned by some good authority. Some splint enlargements remain for the life of the animal, even after continued treatment is applied for the removal. In cases of lameness, however, it is advisable to apply treatment according to the nature of the case. If the cause is an unbalanced condition of the limb, possibly much may be done by proper paring of the hoof and the application of a shoe calculated to remedy the defect. If from striking in traveling, the shoer must endeavor to prevent the occurrence by proper shoeing.

Rest is essential in the treatment of splint lameness. If the part be hot and sore, the application of the cold water spray is good treatment. Irritating liniments or blisters should rarely be used at the start, but blisters of cantharides ointment, plain, or with one eighth part of red iodide of mercury added, is a good blister for old cases of splint lameness, and may assist in the removal of the enlargement. The use of the fine cautery point is advised by many, and is often followed by rapid absorption of the enlargement. Friction applied to the enlargement by means of rubbing the splint with a piece of bone, or smooth hard wood, is a common remedy, and is of some use and easily

applied. Pressure applied by bandaging a small plate of lead, or other hard material shaped like the surface of the enlargement, is sometimes used with great benefit, but care must be taken to have the pressure evenly distributed and the bandage changed two or more times daily, else the skin covering the part may be killed and a painful wound caused. Removal with the bone chisel has been practiced to some extent, but the risk involved is considerable, and the results decidedly uncertain, as the enlargement may be increased instead of diminished by the procedure.

(To be continued.)

The Scientific Principles of Horseshoeing.—14.

E. W. PERRIN.

Fracture of the Hoof, Split-Hoof or Quarter-Crack.

Fracture of the hoof, as its name implies, is a split in the wall, given a different name according to its location. For instance, a fracture at the toe is commonly called a toe-crack; a similar split at the side of the hoof is called a quarter-crack. It is the front feet that are generally affected, either at the toe or inside quarter; sometimes we see a case of split hoof in the toe of the hind foot, but I don't remember seeing a case of quarter-crack in a hind foot, except in the few cases where a foot has been weakened by injury to the coronary cushion from a tread or wire cut.

Causes.

The predisposing cause is a dry, weak condition of the hoof, the result of a deficiency of that glutinous element in its composition, which in a healthy condition binds the fibres of the wall firmly together. This glutinous element may be deficient as a result of a deranged condition of the animal's health. The coronary cushion being a mucus membrane, its function may become impaired through sympathy with some other organ of the body—by a shifting of the seat of inflammation from one part of the body to another. As for instance, we may have laminitis as a result of pneumonia or gastritis. But concussion upon hard roads, the use of seated shoes, too much sole paring and too much rasping the outer wall of the hoof, are among the common causes of fractured hoof.

A fracture of the hoof may commence at the coronet and extend to the plantar surface, or vice versa; a fracture may be but one half an inch long, but if early treatment be not applied it soon extends to the full extent of the wall.

Every blacksmith knows that a split in the end of his hammer handle if not bound will soon spread the full length of the handle, as every blow on the anvil extends the split in the handle. So every foot fall extends the fracture in the hoof. As soon as the split reaches the vascular structure the edges of the split pinch the sensitive laminae, rupturing the capillaries and causing blood to ooze through the crack, which condition is accompanied by acute lameness. Sometimes dirt gets into the crack, setting up irritation, inflammation and the formation of pus.

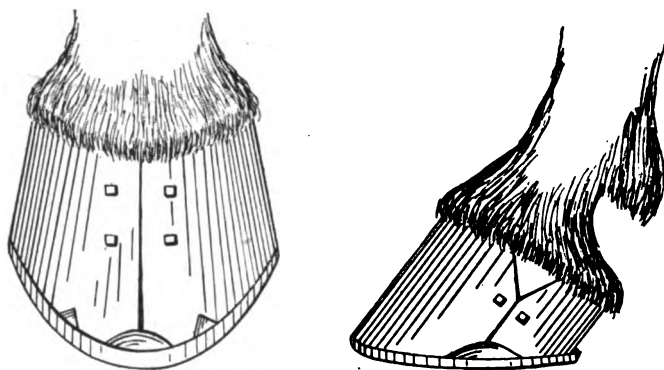
Treatment.

Since prevention is better than cure, the importance of keeping the foot as healthy as possible is apparent. The early treatment to prevent the fracture spreading to the full extent of the wall is very important. If there be lameness, the horse must be laid up, and the foot poulticed to allay the inflammation, or to remove such foreign bodies as sand, dirt, etc. The after treatment consists principally in keeping the edges of the crack together until the new hoof grows down solid.

To accomplish this, various methods of clinching the fracture together so as to prevent its opening with the expansion of the hoof are in common practice. A simple, but effective, way of doing this is to clinch the split by driving one or two nails through the wall from one side of the split to the other—that is, nailing the crack together. Having driven the nails—which requires skill, for they must have a hold deep enough to insure them not breaking out, yet not driven too close to the laminae—then nip off the points and heads of the nails; take a strong pair of pincers, place one jaw on each end of the nail, use strong pressure to bring the edges of the split together, and then clinch. These should be undisturbed; simply allow them to grow with the hoof, unless you fear they are loose, then put new nails in the old holes, or, if they be not sound, repeat the operation in a new place. But this method is not practicable in a weak, thin quarter. In such cases where the fracture extends to the coronet, make a V-shaped cut in the wall at the top of the fracture; then dissect the wall from within the V as close as possible without injury to those structures. I would not advise a shoer who is not a student of anatomy to

attempt this operation, on account of the danger of injury to the secretory apparatus. This being done, clinch the fracture beneath the V; in addition to this, especially where there is any contraction, use an expansion spring. The benefit to be derived by the use of a spring in quarter-crack is very marked. Of course, the hoof must first be softened by soaking, and if this be done, when the spring is released you will see the effect of its expansion in closing the crack.

Shoe with a bar shoe and leather sole, or a rubber pad, taking care to leave the bearing off the wall at the seat of the crack. In a toe-crack, a clip on each side of crack does much to keep the edges of the crack together. Now bear in mind that curing a split hoof is a slow process, for you cannot heal the fracture; you have to bring about such a condition as will insure the new hoof growing down solid, hence in all cases where the split extends the full extent



TOE AND QUARTER-CRACK TREATMENT.

of the wall, the horse must grow an entirely new hoof to effect a cure. You cannot be too careful when the new hoof is coming down. When there is about 1½ inches of solid hoof grown down from the coronet fire deeply across the crack at right angles to the fracture, and in the solid growth, this, if properly done, does much to prevent the extension of the fracture through the new growth. I have known a case of split hoof where the horse got loose and went for a gallop, and when caught it was found that the split had again extended up through the new growth to the coronet; thus the labor of three months' treatment was lost.

I never have any difficulty in curing fracture of the hoof in a draft horse—they walk—but in road stock it is often difficult to effect a cure in a weak quarter while the animal continues at fast work. You may get an inch of solid growth, when the driver will put the horse to some extra or violent

effort, the concussion of which will start the fracture through the new growth, and then the treatment must be started anew; for all your work is thus undone.

As much depends on the care taken of the horse by owner or driver, if you cannot secure their co-operation, you had better rest the horse until you get 1½ inches of solid hoof, which will take about three or four months. As the fractured hoof is generally in a weak condition, owing to an impaired condition of the secretory organs, the coronet must be stimulated with a mild blister, say twice a month, or the application of some embrocation well rubbed into the coronet twice a week.

There are a few cases of fractured hoof, that result from a loss of a portion of the coronary cushion over the fracture, from a wire cut, a tread, a quitor, etc. Wherever a portion of the secretory apparatus is lost, the wall does not grow. Hence there is a fissure in the wall at that part, usually causing a fracture that is incurable.

(To be continued.)

The Brazing of Cast Iron Successfully Accomplished.

Up to within a short time ago, it was considered extremely difficult and costly to mend castings which had become broken. The brazing of wrought iron or steel is practicable, but it was thought that a strong, tight union of broken cast iron could not be made. The difficulty was prob-

ably owing to the impurities of the cast iron, or the large amount of carbon present. At any rate, until recently, a practical process of brazing cast iron was unknown.

Previous methods of mending castings were cumbersome in the extreme. A common plan was to rivet a strip of wrought iron to the casting on each side of the break, so as to hold the pieces in place. This of course was only a makeshift. In addition, great care had to be taken not to break the casting while riveting it. By this method no attempt was made to chemically reunite the broken surfaces. In the foundry, and elsewhere, broken and defective castings are sometimes mended by the process of burning, or pouring on molten iron, but this is very laborious and uncertain at best.

A new brazing process is now being introduced by means of which, as it is claimed, broken castings can be perfectly mended by any mechanic; a

blacksmith's fire and a few chemicals only being required. The process was discovered in the year 1901 after much patient research by Fredrick Pich, a German chemist, and has been largely introduced in Europe. It is now being developed in this country by the American Brazing Company, Philadelphia, Pa.

A successful process of brazing cast iron carries with it great possibilities. When one stops to consider the enormous number of castings, some of them of great value, which are each year thrown on the scrap heap by reason of some small break, it is easily understood what a great benefit to the industrial world a process would be, by means of which broken castings could be speedily and surely mended. It often happens that the real value of a broken casting itself is not very great, but delays arising from replacing the broken part with a new casting might mean large money losses to a manufacturer. By this new discovery, such delays may be prevented.

Realizing the importance of this discovery to the craft, THE AMERICAN BLACKSMITH Company has been investigating for some time the properties of Ferrofix, the new brazing material. It was our purpose to learn if the process would do the work, and whether it could be handled successfully by mechanics not specially trained. We sent a Ferrofix brazing outfit and directions for use to a blacksmith, and requested that he test it for us. He reported that he was unable to successfully braze the piece he undertook to mend. Believing, however, that his failure might be due to not following the directions, we had several more tests made, this time personally supervising the same. The success of these tests showed that the previous failure could not be laid to any fault of the process, but rather to not heeding the directions. One of our tests consisted in placing a ten-inch bar of cast iron, one square inch in section, in a testing machine, and breaking it by flexure with an application of 2,800 pounds at the center of the bar. The bar was then brazed, following the directions, and half an hour later was again placed in its restored condition in the testing machine; fracture occurring this time with a load of 2,400 pounds. The fractured section showed that the bar had not been brazed along one edge, which accounts for its breaking at a less strain. Failure to braze at this portion was due to the fact that the clamp used to hold the pieces of the

bar together was inefficient, and left a crack of considerable width at the edge where the brazing failed. Another test was then made with a similar bar, using a better clamp. Much better results were obtained, the bar breaking under practically the same pressure before and after brazing. In both these tests the second fracture was at a new place, a film of cast iron at least $\frac{1}{8}$ inch in thickness covering the original break. In our test, the bar breaking in new places showed, strange as it may seem, that the fractured section was stronger after brazing than before. This may be due to burning out the carbon and weakening impurities during brazing, leaving a film of iron on each side of the reunited break, purer, and hence stronger than the original metal.

It has been reported to us that tests were conducted under similar circumstances at the Altcona Laboratory of the Pennsylvania Railroad. An attempt was made to fracture a brazed joint on some heating sections. The piece was broken under a strain of 14,000 pounds, but the fracture was from $\frac{1}{2}$ to $1\frac{1}{2}$ inches away from the braze. The second piece was broken under a strain of 22,000 pounds in like manner, only that for the space of about one inch along the length of the joint (which was a cast iron pipe about four inches in diameter), it was almost on the brazed joint, a thin film of cast iron only intervening.

From the investigations which we have pursued, we feel no hesitation in saying that any mechanic, by means of Ferrofix and careful attention to instructions, can successfully braze most broken castings. It would seem to us to be one of the most important discoveries of its kind in recent years.

The American Blacksmiths and Horseshoers' Association.

A Proposed Movement of Vital Importance to Every Blacksmith, Horseshoer and Wheelwright.

The business condition of the blacksmithing, horseshoeing and wagon building craft has long been receiving the careful consideration of THE AMERICAN BLACKSMITH. The various items and published articles dating from the initial number of this journal have brought forth a multitude of letters from the craft everywhere, with regard to the several great evils which affect the welfare of "our folks." We need hardly mention of what these consist: Bad debts, slow collections, low prices and poor mechanics.

Many methods of solving the problems involved have been suggested. These have been carefully investigated from every view point. As this issue goes to press, we are able to announce that within a very short time the incorporation of an association under New York State Laws will be completed to take up organized, systematic and persistent effort to bring about a number of radical reforms throughout the entire country. The movement is to be organized under the name, "The American Blacksmiths and Horseshoers' Association."

It may be said here, that the primary and most important object in view is the passage and rigid enforcement of a lien law in every State, which will legally protect each member of the craft and insure prompt payment for every piece of work done. This is something every smith recognizes the need of; it should have been brought about long ago. There are many other questions which mean much benefit to the craft which may be championed by the Association. These subjects will be taken up later.

THE AMERICAN BLACKSMITH has been requested to become the organ of this movement, and this it gladly does. The aims and purposes have been presented for our consideration, and meet with our hearty approval for their honesty of purpose, and clean-cut, systematic effort for the advancement of the craft. It is high time for every one of "our folks" to get into line to secure that legislation which is almost absolutely necessary for the profitable conduct of their daily business. Other trades have secured it—why not ours? It cannot be accomplished in a day, and for early success, the movement must enroll the sympathy and concerted action of every blacksmith, horseshoer and wheelwright in the United States and Canada. At this time correspondence is earnestly solicited, and suggestions are in order. The services of an organizer will be needed in all counties. The plans proposed are broad and wholesome, so that no craftsman can have any hesitation about lending his support. The influence of the large army of blacksmiths and wheelwrights, if unitedly enrolled under one banner and working steadfastly toward one end, by their numbers alone will go far toward securing that which we so much need. Attention is called to the blank on page XI of this issue. Every man of the craft is invited to join in the movement, and to keep in touch with its progress, as will be outlined in succeeding issues of this paper.

Has your Subscription Expired?

If you find a bill in this copy for next year's subscription, it means that your subscription has expired.

If it has expired, we hope you have found the paper so valuable to you in your work that you will remain with us another year, and for many years to come. Thousands of subscribers have written that a year's subscription to THE AMERICAN BLACKSMITH is worth a great deal more than a dollar to them, or to anyone interested in blacksmithing, carriage-building or horseshoeing. Many say one issue alone is worth that much. This, however, is a matter for you to decide.

It is our purpose and endeavor to put out a paper worthy of the craft, and we would appreciate the aid and encouragement of a prompt renewal subscription from you. At the same time, also, tell us how we can make the paper more valuable to you.

We have constantly in mind the effort to make THE AMERICAN BLACKSMITH better this year than last by far, to make each issue better than the preceding one. The preceding article shows how deeply we have the interests of the craft at heart. We do not wish to take your name from our lists at the present time, and hence hope you will send us the money at once. No renewal subscriptions will be taken for less than one dollar per year.

Remit by money order, express order, registered letter or stamps. Do not send checks, as we cannot collect face value on them. Let us hear from you.

Address THE AMERICAN BLACKSMITH COMPANY, P. O. D. 974, Buffalo, N. Y., U. S. A.



The following columns are intended for the convenience of all readers for discussions upon blacksmithing, horseshoeing, carriage building and allied topics. Questions, answers and comments are solicited and are always acceptable. For replies by mail, send stamps. Names omitted and addresses supplied upon request.

How to Temper Stone Hammers—Will some one give me a good recipe for tempering stone hammers? JAMES DAVIS.

Tempering Copper Springs—Will some brother blacksmith tell me how to temper copper springs? FRED BARNEY.

Tempering Mill Picks—Can any brother blacksmith give me a first class recipe for tempering mill picks to be used in country grist mills? E. SAGER.

A Shoeing Inquiry—I would like some brother smith to tell me some way of shoeing a horse that knuckles over in front and whose feet are contracted also. B. F. FRENCH.

A Question on Hardening—I would like to know a good way of hardening the inside of anything in the shape of a cylinder, without hardening the outside also. How is it best done? FRED BARNEY.

Tire Furnaces—I should like to ask through the columns of THE AMERICAN BLACKSMITH how to construct a cheap tire furnace for heating tires, five feet in diameter and smaller. O. M. BERRY.

Season to Cut Timber—If J. E. Gaines will cut his timber in July or August, and according to the old superstition in the dark of the moon, he will never be bothered with worms in the timber. B.B. MALLORY.

The Shoe Knee Hitters—In replying to Mr. T. C. Troster's question about knee hitters, pare the foot level and use a side-weight shoe, putting the heavy part on inside. I have never failed by using this shoe. W. L. G.

Cracking of Steel—I would like to know the cause of steel cracking when cooled off quickly, that is, when tempering drills and tools of that kind. They sometimes chip off. Does it show the wrong kind of steel? FRED BARNEY.

Treating a Thick-Soled Foot—I would like to hear from some of my brother farriers, as to how to treat a horse whose foot is very thick in the sole and very lame. When I pare it out well and apply tar, oakum and leather, he goes all right for two weeks. I would like to fix him up, as he is a fine horse. J. K. AKINS.

A Question on Forging—How can I shoe a line trotter that forges? In the first place I don't want to widen the action of the hind legs with side weights, and second, I don't want to shorten the stride with heel weights. The horse is not intended for the track, but is only a driver, and he has this bad fault, which I wish to correct. M. S. HEWITT.

Removing Old Spokes—I think M. W. Ralph will find a very simple and effective way for removing spokes in the following: Having the wheel solid on a wheel-jack, cut a notch in the spoke. Place a brace or block under the spoke directly under the notch, and then give a quick, sharp blow in the notch. This will remove almost any spoke. B. B. MALLORY.

An Experience with Gas Engines—In answer to the question of Hans Hanson in the October issue with regard to a 2½-horsepower Weber Engine for wood sawing, I would reply that I have used one since last spring, sawing wood, cutting ensilage, running a threshing machine and a churn. I can saw two cords of wood an hour with a ninety-pound fly wheel, using a twenty-four-inch saw. R. I. PARKHURST.

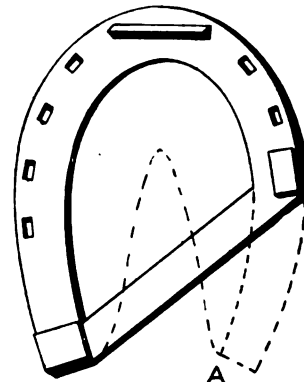
A Few Questions for the Boys—I would like some of the craft to tell me how to build light metal wheels for pony carts, tricycles, etc., using thick gas pipe for hubs; how to braze the flanges on the ends to fasten the spokes in. Also the best way to make molds for casting spur, bevel and interval gear wheels. I am going to give the boys my plans at an early date for making a lathe for metal work. The material costs only a few dollars. WM. DUFF.

Shoeing for Interfering—For interfering hind feet I always use a light rocker toe shoe. Rock the foot out all you dare, place the toe calk on the inside, and make the inside twice as high as the outside, so that when the foot breaks over it will rock out. My advice would be to put on a shoe

of this kind and then watch the action of the horse from behind. If this fails, try a side-weight shoe. C. A. GARY.

Gather on Wooden Axles—In the October issue, the question was asked by H. O. Walker as to how to get the gather on a wooden axle with skein. Center your axle at the large end of the hub, also at the small end. Then drop the centre point $\frac{3}{8}$ of an inch down and $\frac{1}{4}$ of an inch forward of the first center, and work from this last point for the center of the axle when finished. G. D. GILLIS.

A Good Shoe for Bad Corns—Noticing an article by Mr. William W. Peters, I wish to give a diagram of a shoe which I used on a festered corn; the letter A shows the seat of corn. The horse was very lame.



SHOE RECOMMENDED FOR CORNS.

This shoe was put on and the horse was used on a butcher's wagon and never lost a day. This is an original shoe, as I have never seen or heard of one like it, but it works well. J. H. DIETRICH.

Case Hardening—I noticed in the September issue that some brother smith asked about case hardening. I claim that I can take a piece of ordinary hoop iron, draw it to an edge, and harden it so that it will cut the toughest wood without bending. This process is good for buggy axles and the like. Take prussiate of potash and pulverize it finely. Heat your iron to a cherry red and then roll in the prussiate of potash, or sprinkle it on until it melts. Then plunge into cold water, and you have a good hard surface. WILLARD MANN.

An Interesting Question—I hold respect and a feeling of sympathy for one that will try to glean knowledge through reading. One to be up-to-date today must devote a certain amount of time to educate himself. I can only say, study the anatomy of the foot and limb, and then pathology, and I am sure we all will do better, give perfect satisfaction, and be a god-send to the noblest and best of dumb animals, the horse. I want to ask this one question. Wherein lies the seat of pain in a horse in front? And if the methods of shoeing the past hundred years have been right, why do our horses go wrong? H. N. MUDGE.

Plow Lay Tempering—For tempering lays without warping, heat to a cherry red, and dip straight up and down into a solution made of three pails of salt, one pound of salamoniac, one pound of blue vitriol, one-half pound of cyanide of potassium to one barrel of rain water. Have a tank that will contain six barrels or more. Sink it in the ground so the top is nearly flush with the ground where it will keep cool during the summer. This

will cool your lay quickly, the slow cooling being the chief reason for warping. Have your lay right before dipping, and you will have very little trouble.

T. K. HANSON.

To Make Shoes Stay On—To W. H. Hahn's question "How can shoes best be made to stay on?" my answer is as follows: Pare the feet down perfectly level, but not too close. Make the shoes to the feet. Be sure the heels of the shoe get a full bearing on the quarters. Leave the rim as wide as possible. Set your nails slanting and high. There is not much danger of pricking, even though high, if they are driven out at the right angle. Star and Capewell horse nails are the best in my estimation. By this method, I have had shoes stay from two to four months. As a common thing, farmers as a rule leave shoes on as long as they are solid, and I never had a kick on their not staying.

T. K. HANSON.

A Plow Work Answer—Noticing some inquiries in the October number, I will submit the following to Hans Hanson, Jr., on "A Plow Work Question:" Make your lay level on the bottom of the landside and no more. Make the edge of the level to suit the landside and roll up a scant $\frac{1}{4}$ of an inch on the heel, extending gradually for about five inches. This throws the bearing of the right-hand side of a plow, which in nine cases out of ten is where the trouble comes in. For hard ground, finish the same as in the first case, but only before hardening give it a tap on the point downward so it will hug the ground hard. This is for sulkies or gangs. For easy draft in either case use good, soft, center steel and temper. Avoid any hollows along the center of the lay.

T. K. HANSON.

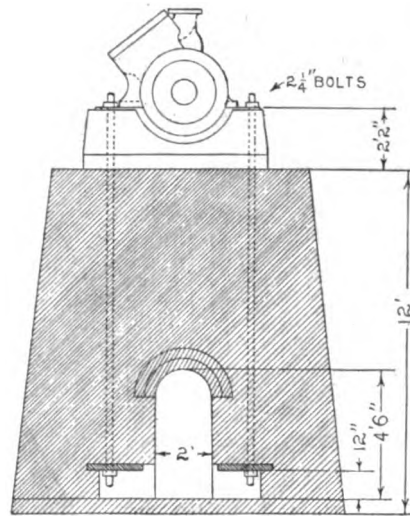
To Make Shoes Stay On—I would like to answer W. H. Hahn's question. To make the shoes stay on, use the Capewell nail. For No. 5 shoe and a good, strong foot, I would use No. 9 nails, "City" head, as the "Regular" head sticks out, and coming in contract with the cobble is driven up and of course the clinch raises. Next I would say, make the foot level, and fit the shoe full to the outside of the foot. Give a toe and heel bearing and have the shoe to fit slack on the quarters both outside and in, but more so on the outer quarter. Drive the nails high and strong, cut the clinches short. File under well, but not too much to finish. I use a Bryden shoe and while there is any shoe left it will not get loose. Always use a good, stout nail, and point it toward the toe and never back or straight. The more a nail points forward, the more hold it has.

J. H. DIETRICH.

A Good Scheme for Shoeing Bad Horses—Noticing in your August issue that a smith asks for a plan for shoeing vicious horses, I will give the plan which I use as it may help him and others. I take a one-half inch rope, about twenty feet long, and make a loop in one end large enough to slip over the under jaw. I then run it under the collar, between the front and between the hind legs, and bring it around by his side. I then twist it around the piece between his front and hind legs about three times. Draw it up tight. Let one man hold on to the end of the rope, and the blacksmith is ready to begin operation. The horse will not kick many times, but the rope should be kept on all the while, as it will not be in the way of the smith. I have shod lots of bad kickers in this way, and have always had great success.

B. R. SLACK.

An Interesting Problem—I show here a drawing of a cylinder and bed plate of an engine, the bolts of which $2\frac{1}{4}$ inches in diameter, broke off just where they were welded (lap weld). The bolts in setting were put inside of a wooden box and cement poured all around. As the figure will show the broken bolts have to come up, and cannot be driven down as there is no room for this. Three bolts are broken, all in the same place, about five feet from the top of the bed plate. It was a very poor weld in each case, as it showed the scarf. I would like to hear from some of my brother blacksmiths and mechanics as to how they would remove the bolts. I am the head blacksmith in the National Steel Company's Mill, at Columbus, Ohio, and the Master Mechanic called on me to help him get these bolts out. They had to be



BROKEN BOLT TO BE REMOVED FROM AN ENGINE FOUNDATION.

replaced before the mill could run, as it was not safe to run the engines without them. I would like to have some of the boys tell me through the columns of this paper how they would take them out. Then I will show how we did the job.

GEORGE GARDNER.

How to Make Shoes Stay On—To shoe a horse to make the shoes stay on long requires care in several steps of the work. First, in fitting the shoe the nail holes should be punched slightly slanting, so as to follow the slope of the foot. Also punch them just large enough to take the nail required and no larger. Next fit the shoe to the hoof all around, taking care to fit it full at the quarters. Before proceeding to drive the nails, or better, before selecting the shoe and fitting it, examine the wall of the foot to see whether it is thick or thin. If it is a thick, strong wall, the nails may be started deep and be driven low, but if the walls are thin and weak, the nails must be driven shallow and consequently high, in order that they may have a good hold. In drawing the clinches, be careful with a tender, weak foot not to draw them too tight. In cutting off the clinches remember that a clinch one-sixteenth of an inch long properly done will hold as well as one three-sixteenths of an inch long. HARRY LENHART.

Remedy for Knee Hitting—In reply to a question in the November issue by J. C. Troster, I will give here a method of my own, which has worked successfully on knee hitting. Take a front shoe and turn the heels as usual, leaving the inside heel calk just a very little higher than the

outside one. Weld a toe calk on the inside fully as high as the heel, and draw it down to a feather edge on the outside of the shoe. Then draw a little of the outside of the shoe up, as you would a toe clip. Begin at the toe calk and turn up as far back as the second toe nail hole. Then level the foot as near as possible, and set shoe as full on the inside as the gait of the horse will allow. By taking off as much of the outside as it will stand without injury, you aid nature a little, which is all that is necessary. This gives the foot a tendency to roll to the outside toe. If this is repeated about three times, the horse's feet will naturally level up, and he will never hit his knees. That is my experience. If Mr. Troster can understand my meaning, this method will be of good use to him, and if properly done cannot fail.

M. L. BEAL.

Plow Laying—Referring to the matter of plow laying, I would say that I think Mr. Green's article on page nine of the October issue is in the main correct. I do the work in about the same way, except that I do not use clamps in fitting. I first fit the short landside in line with the plow. Then I cool it off, place it in position with my hand, lay on the share, and change it if necessary to lay down all along the line. When the landside is in position, take a pencil and mark on the outside edge of both lay and landside. Then mark the place with a chisel, place the point of the share in the fire and bend the point under. Place the landside between, hammer it down solidly and commence to weld, always keeping the marks together, and a perfect fit is guaranteed. The grand secret is in welding and in taking the heat. This must be done evenly all through the landside, not allowing a heat on the top corner with a third of the bar cold. Use a light, broad-faced hammer. Practice in this line is necessary for success. Theory is very well to have, but alone it is worthless. I have a pair of tongs, such as Mr. Green shows, but I have not used them for years except on old lays where the bar has broken off. I think Mr. Green is all right on long landsides, except that I work to a mark to avoid taking off the whole plow when welding up. Take the first heat at the top and work down. C. W. SMITH.

An Interesting Letter—Please find enclosed \$1.00 for another year's subscription to THE AMERICAN BLACKSMITH, your valuable paper as well as my own. I not only consider it as your valuable paper, but a valuable paper for myself or any other blacksmith, horseshoer or wagon maker. What interests me the most are the articles printed for the three above mentioned craftsmen, horseshoers especially. There is coming a time when we blacksmiths will be dropped and dropped awfully hard too, if we don't master the art of horseshoeing; and every one who practices the art ought to be compelled to pass a State examination or be dropped.

I wish to make a reply to the question of J. C. Troster in the November issue, "How to shoe a knee hitter?" The case he refers to may be a very stubborn one to effect a complete cure on by the first shoeing, but I will give my idea.

Pare down the outside of the foot as low as good judgment will allow. Make a heavy inside-weight shoe, according to the weight of horse and size of foot, fit the shoe full to the inside and close on the outside, leaving the outside even in length with the heel of the foot, with a very low calk, if any at all. Let the inside run back a little beyond the heel with a side calk

welded on or turned on, either way will do. I would weld a low toe calk in the center of the shoe and bevel it towards the outside of the shoe as much as possible. If the horse does not stand square, or his ankles are inclined outward a little, take a piece of leather and lay it under the shoe on the inside from the center of the toe to the heel. Have the shoes reset every two weeks, as the inside is undoubtedly weak, and will give way before the shoes would need resetting on a sound hoof.

WM. BALDWIN.

Spoke Drawing and Timber Cutting—I saw in the November number of *THE AMERICAN BLACKSMITH* a query by M. W. Ralph for a simple device for drawing tight spokes from a hub. Saw into the back of the spoke and cut out a notch. Take a hand ax or foot adze and drive the spoke out. First place the spoke on something solid, and hold a sledge hammer underneath the notch in the spoke while driving it out, and you will find very little trouble in drawing the tight spokes.

Also brother J. E. Gaines wants to know the best time of the year to cut oak and hickory timber. Cut it in the spring of the year as soon as the bark will peel off nicely. Then put it away out of the weather, but place sticks between it to keep it from springing or warping. You will then have timber that the worms will not bother. I am now in my sixty-sixth year, and have been working in the wagon shop ever since I was eighteen years old, and have worked timber gotten out at all seasons of the year, and find that which is cut early in the spring by far the best. It is more solid, harder and heavier. If you want good hard spoke and fellow timber, get it out in the early spring, throw them in the water and let them stay there eighteen months. Then take them out and put them away out of the weather for eighteen months. Have the spokes turned and the fellows sawed out and dressed and put into wheels, and they will last a lifetime, for my father has tried it twice.

I think that brother R. A. Wood's way of drawing tight spokes from the hub is rather too much work, and then it will not do on buggy spokes. To cut a notch with square shoulder in the back of the spoke and drive them out is simpler, and will do for large and small spokes.

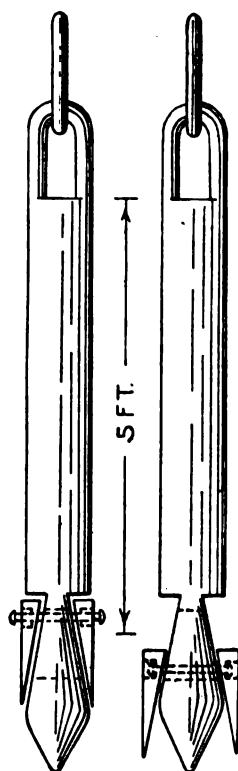
D. J. LESSEL.

Welding Plow Lays—In answer to W. A. Henry on welding up lays, I will give my method, which rarely fails, even in welding lays by the hundred. Make your landside slant with the frog of the plow, and bevel in the bottom one quarter of an inch deeper than landside of plow, as the weld takes up about that much. It is always well to have the landsides deep enough. Get the bevel on the landside point right with the point of the moldboard. If you use share, upset on the outer edge. Of course you must allow for that in the bevel. Now get your point set right on the landside. Next fit your lay, and remember that ten minutes extra spent in fitting your landside and lay may save you an hour after you commence welding. Fit your lay so it rests well on the heel of the landside and perfectly close down for about seven inches. I use a clamp made out of one by one-half inch stock with which no set screws are necessary. See that the back of your lay has the same curve as the moldboard and when resting the lay firmly on the landside, should it not fit the back brace on your plow, give the lay a twist till it does. Then lay share on landside and drive the clamp up to within about five inches of

the heel. Make an ordinary wedge and drive it between your lay and landside point to throw the pressure on the heel. Now clean your fire, take the first heat on the heel and work towards the point. Finish as you go along, which saves running forth and back over the lay. Always turn under all you can nicely spare and never cut off the point, as that is the strength of the lay. Following these rules, you will have no trouble in welding. Use clean borax. Drill no holes before welding. I have welded hundreds of lays by this method and to my knowledge have had but one lay crack open in the weld, and that after it had run two seasons.

T. K. HANSON.

Tools for Removing Pipe from Drilled Wells—I have seen in your paper some tools for removing pipe from drilled wells, and as I have made one myself which I think will never let go once it has taken a hold, I will explain how I made it.



A DRILLED-WELL PIPE-REMOVING TOOL.

For a tool to remove a $1\frac{1}{4}$ -inch pipe, I take a piece of 1-inch round steel about five feet long. Then I take a piece of $\frac{5}{8}$ -inch rod, two feet long, and after bending it into the shape of a V, weld it to one end of the first piece, making a loop some seven or eight inches long for a sliding link to play in. This will aid in starting the pipe if it should happen to be very firmly held. On the other end of the one-inch rod I hammer out an inverted wedge seven inches long, and beyond the wedge I taper the iron to a point. Starting about one-half an inch from the shoulder thus formed, I cut an oblong hole about three or four inches long through the wedge from flat side to flat side. I then made two wedges which will fit into the recess of the one-inch rod, formed where the inverted wedge was made. In each of these small wedges I made a hole $\frac{1}{8}$ of an inch in diameter, $\frac{1}{2}$ of an inch from the larger end. Then using a $\frac{1}{4}$ -inch countersink, I counterbore the holes on the rounding side of the piece

nearly through the flat side. Placing the two wedges in the recesses of the one-inch rod, I put a piece of $\frac{1}{4}$ -inch iron of the proper length through the holes in the two wedges and the slot in the inverted wedge on the inch rod. This $\frac{1}{4}$ -inch piece I then upset on each end, making it just long enough so that the small wedges will have a play of about three inches in the direction of the length of the tool.

When I use the tool I wrap a piece of wire around the wedges on the lower end just tight enough to hold them in place while the tool is being lowered, but which will be pushed up when it is once in the pipe, thus releasing the wedges which slip down and are ready to take a grip on the pipe. I then give the tool a few sharp jerks to secure a good hold and then a steady pull generally moves the pipe. I guarantee that the pipe will split before the tool will slip.

ANTON OLESON.

Some Good-Natured Kicks—This is just plain shop talk and a few kicks. I heartily sympathize with Mr. Smith in his kick about farmer blacksmiths, as we have some of them here, but they are not the only ones that help make life miserable. The late comers are among them. I don't mind working hard all day, but I want to stop when night comes on. Some men will insist on you working after hours, and then get mad if you don't do it.

Then there is the "can't-wait" man. You know him by the cut of his jaw. He comes storming in and wants you to stop everything and do his work. He is in an awful hurry. You work like sin to do his job in time and the chances are he will stay around all day after all.

Then again comes the man with his plows. He has wired them in his wagon good and strong. He will call you out and take up a lot of your time, telling you all about them, and he will suggest to you how to fit them. While you are helping take off the wires, you could almost do the work. During the time he is telling you about it, the "hurry-up" man is poking you in the short ribs to get his work done.

And how about "Old Windy?" You know him, don't you? Well, he comes in and takes hold of your bellow's pole and proceeds to talk you to death. He tells you all about everything you should know. He tells you that you are the only man that can shoe his horse to keep him from interfering, and that he won't let any one else shoe him as long as he gets it done on "tick," as he calls it. About this time a team draws up and a farmer wants a bolt put in his buggy. He says it won't take you a minute, so you go out to put it in and while you are gone "Old Windy" takes a "fool" notion to blow your bellows just to keep your shoes hot for you. When you go in he has them burnt up.

There is still another man. He is the "Cheap John." He comes in with a basket of horseshoes that he has collected goodness knows where. There are not two alike in the whole lot. He thinks you are getting rich and wants all he can get out of you. I am not referring to the poor "cuss" for I like to help them. I had one occasion to put in two axles for a man of the cheap class some time ago. When the work was done he wanted to take the old axles home with him for wood. He lived in the country with plenty of wood and we were paying \$3.50 per cord for it. But it takes all kinds to make up the world. As the old man said to his friend, "Everybody's a little queer, but you and me, and sometimes I think you're a bit queer too."

W. L. G.

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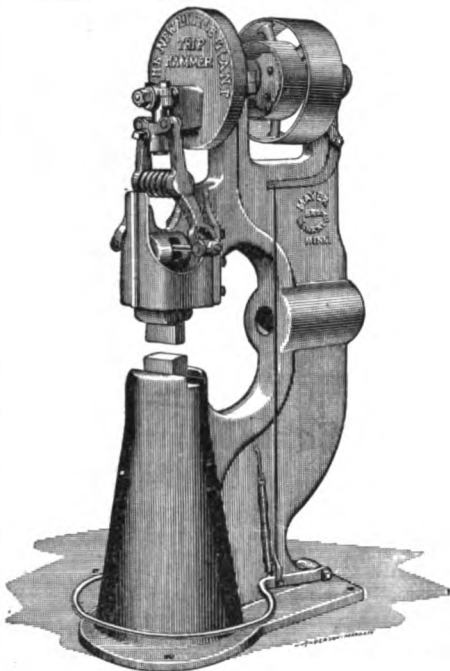
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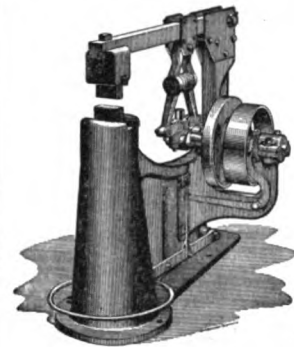
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Please enroll my name as in favor of securing in this State a Blacksmiths and Horseshoers' Lien Law, and other legislation favorable to the craft. I agree to use my influence personally and by correspondence with our representative in the State Legislature.

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Want and for sale advertisements, situations and help wanted, articles new or second-hand, and business opportunities, will be inserted under this head. The rate is twenty-five cents a line. Send cash with order. No insertions of less than two lines accepted. All answers to advertisements received at this office will be forwarded to their proper destination.

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All prices, except on the bolts and nuts, are per hundred pounds. On bars and flats prices are in bundle lots.

Bars—Common Iron and Soft Steel.
 $\frac{1}{4}$ in., round or square; Iron, \$3.10; Steel, \$2.90
 $\frac{3}{8}$ in., " " " 2.70 " 2.70
 $\frac{1}{2}$ in., " " " 2.50 " 2.40

Flats—Bar and Band.
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 $\frac{1}{4}$ x $\frac{1}{2}$ in., " 2.40; " 2.40
 $3\text{-}16$ x $\frac{1}{2}$ in., " 2.60; " 2.60

Norway and Swedish Iron.
 $\frac{1}{4}$ in., round or square, \$4.90
 $\frac{3}{8}$ in., " " 4.50
 $\frac{1}{2}$ in., " " 4.30
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For No. 1 shoe, $\frac{3}{8}$ x $\frac{1}{2}$ in., \$3.40
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 $5\text{-}16$ x 3 in., .75; $\frac{3}{8}$ x 6 in., 2.10

Tire Bolts. (Net Price per Hundred).
 $3\text{-}16$ x $1\frac{1}{2}$ in., \$0.18; $\frac{1}{4}$ x $1\frac{1}{2}$ in., \$0.28
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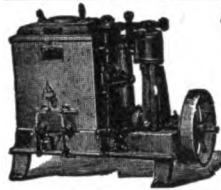
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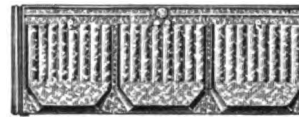
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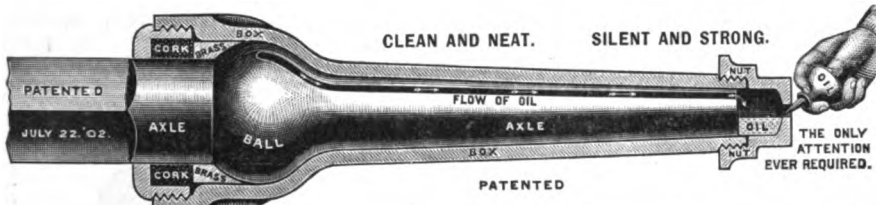
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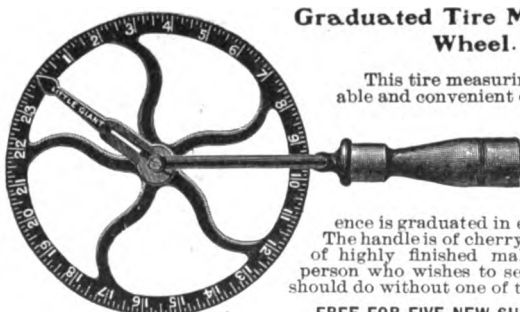
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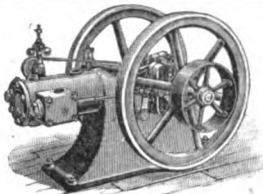
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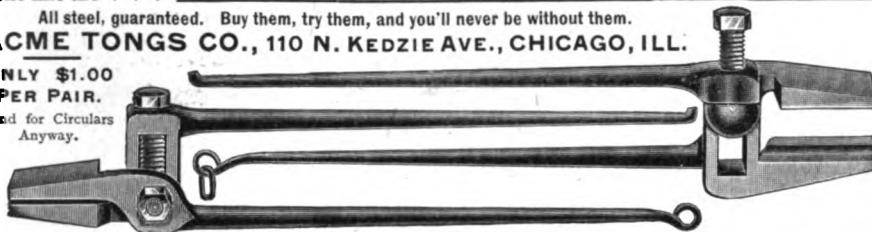
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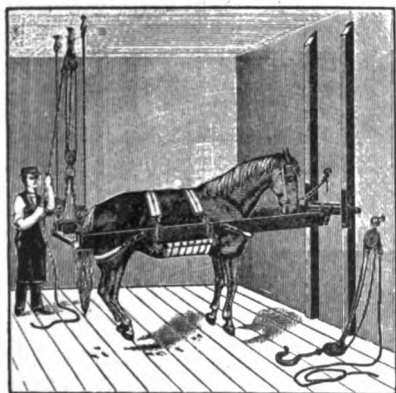
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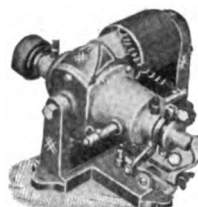
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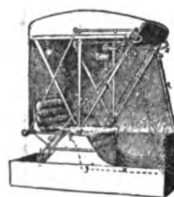
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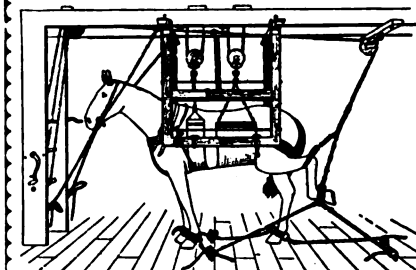
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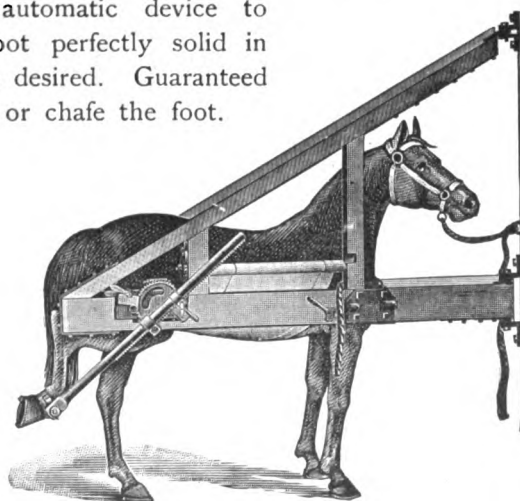
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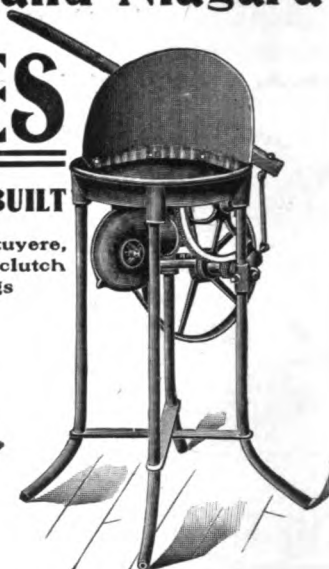
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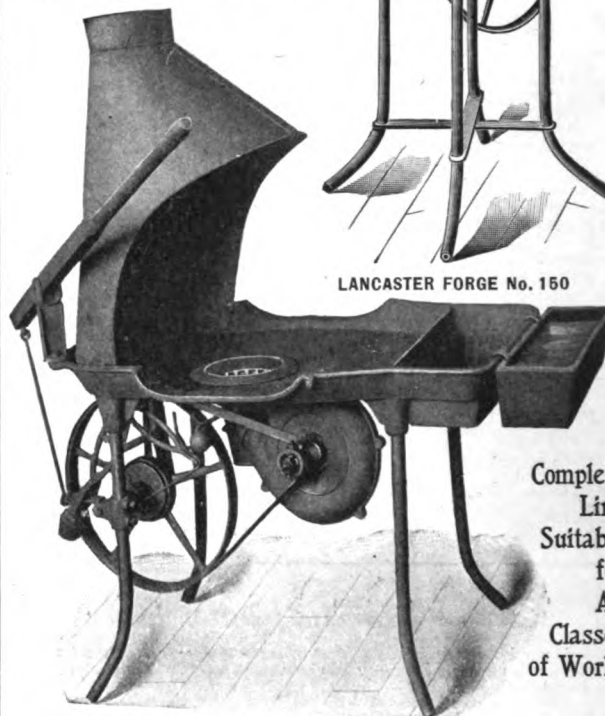
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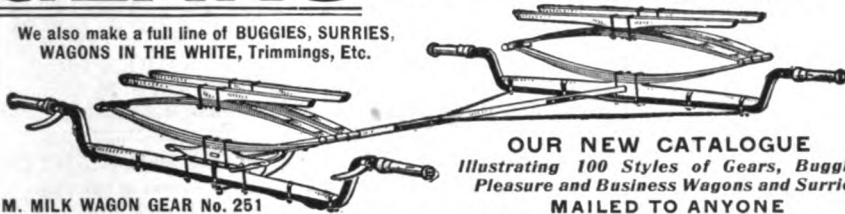
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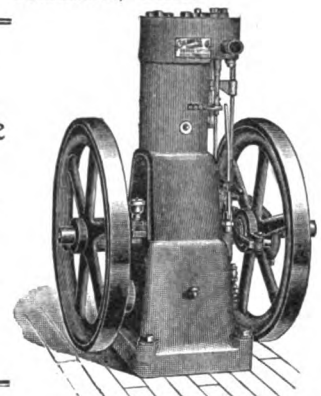
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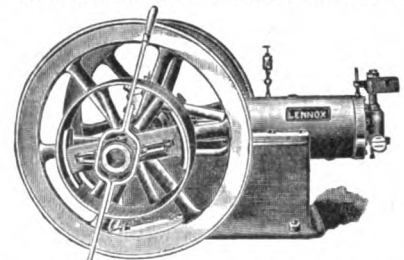
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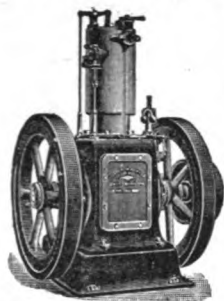
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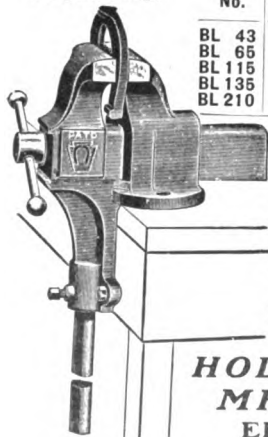


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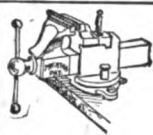
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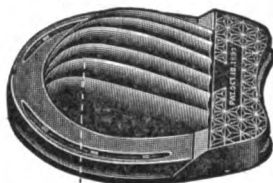
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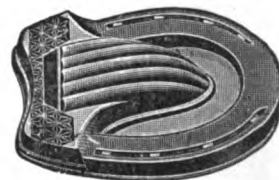
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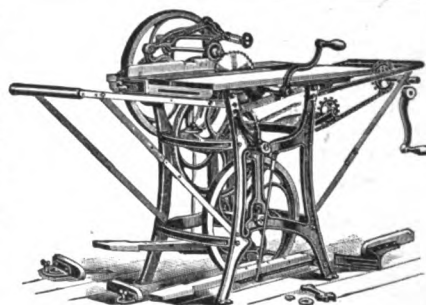
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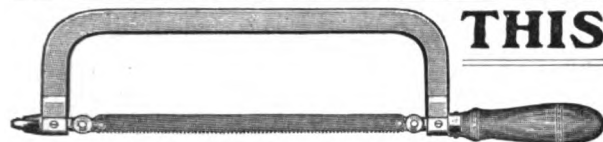
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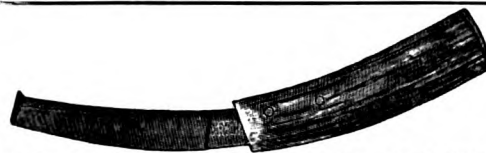
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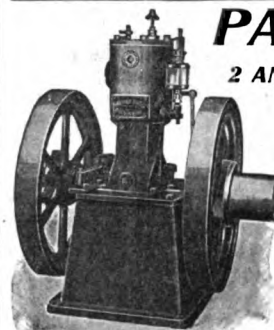
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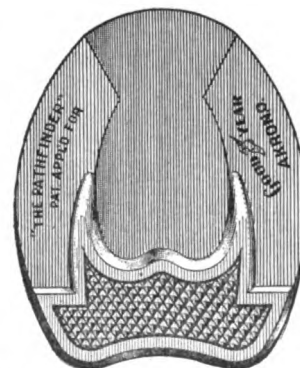
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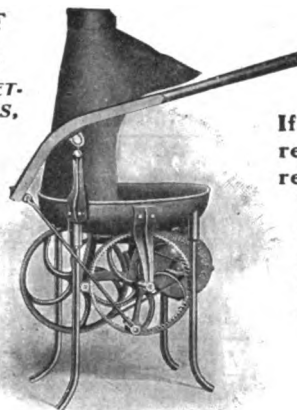
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Please send me by mail one pinion, or small gear, No. 178, for Blacksmith Forge, No. 0. I have used the Forge nearly seventeen years.

Yours truly,
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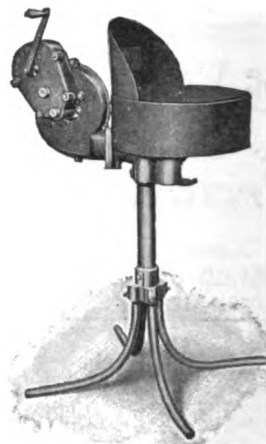


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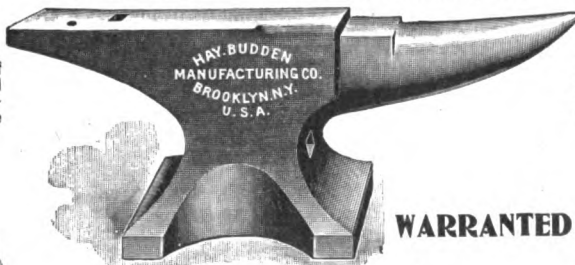
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THE

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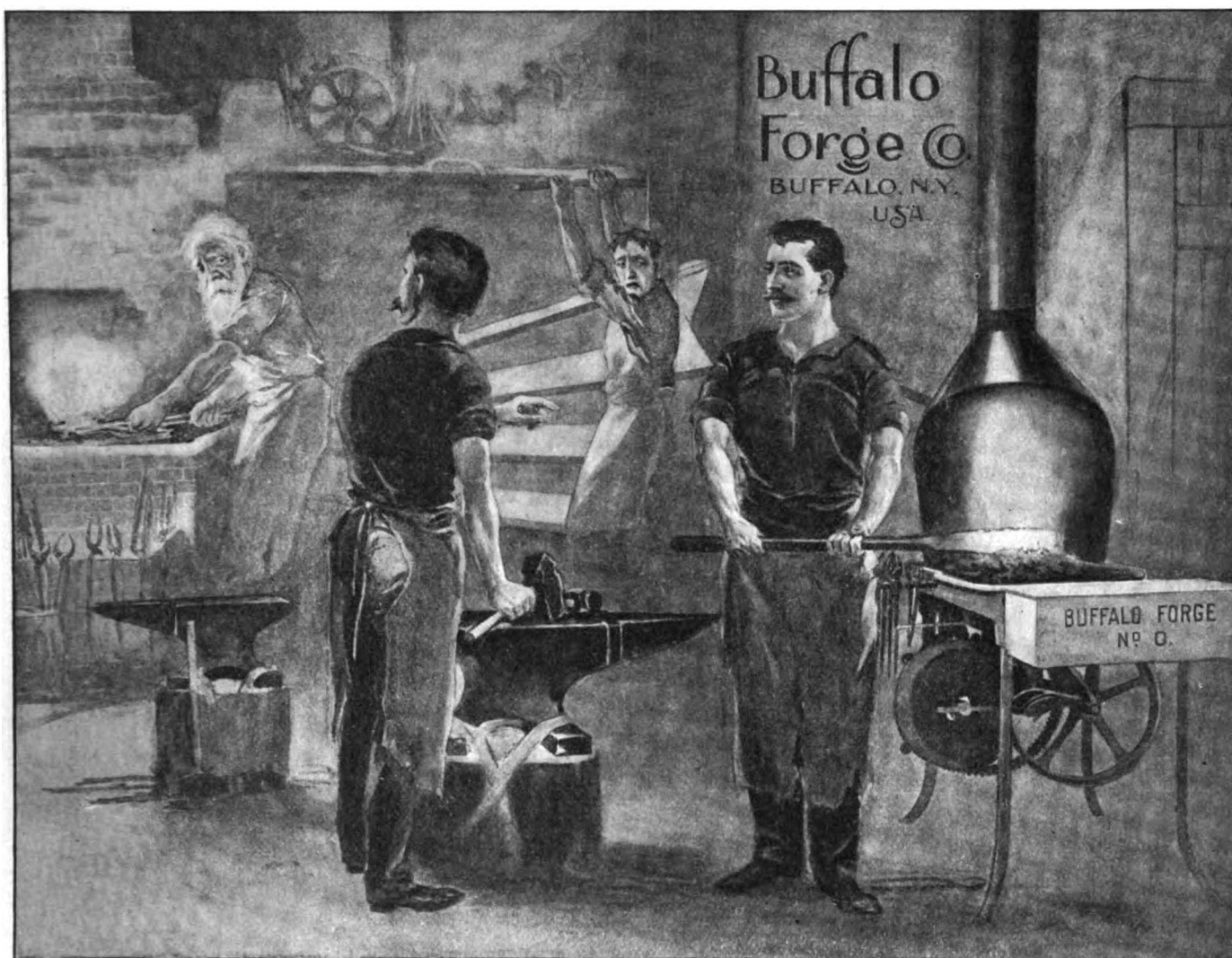
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BUFFALO
N.Y. U.S.A.

A PRACTICAL JOURNAL OF BLACKSMITHING

JANUARY, 1903

\$1.00 A YEAR
10¢ A COPY



Poor Old Onceuponatime!

His strength is gone and he's quite worked out,
Though he's only fifty or thereabout ;
And the young 'prentice scowls as he toils away,
While the customers chafe under long delay.
Oh, slow is the fire that the bellows blow,
In the forge as it stood thirty years ago.

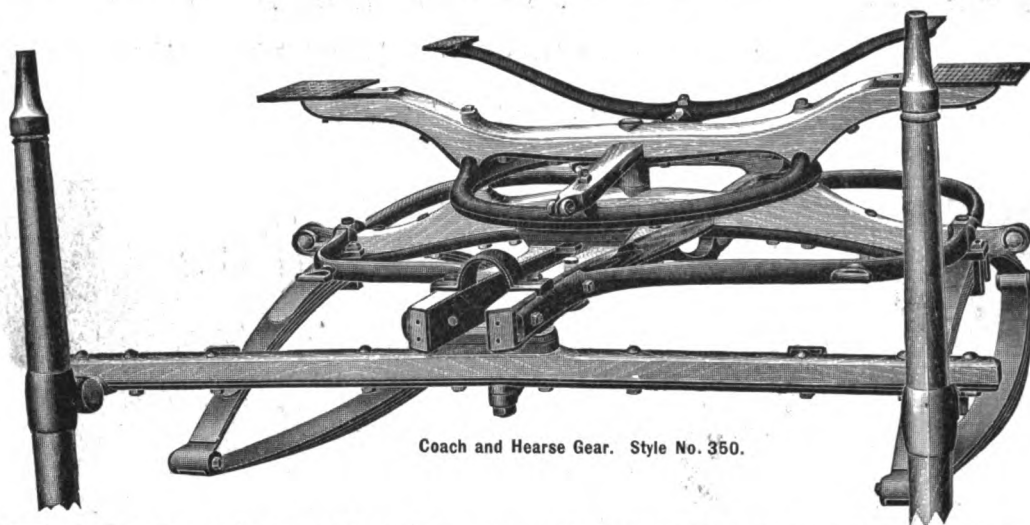
Prosperous Neighbor Uptodate!

The good 'smith's countenance beams with health,
And his heart is glad, for he's coining wealth.
A clean, bright shop and a clean, bright fire—
The 'prentice declares that he'd never tire.
Oh, his work's first-class and his custom's large ;
For he uses a Buffalo blower and forge.


Send name and address on a postal card for a handsome
reproduction in six colors of the above picture ~ ~ ~

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Coach and Hearse Gear. Style No. 350.

GEARS with or without Springs and Axles Welded and Clipped, with Top Gear and Spring Bars ready to receive Body.  Also Wheels, Shafts, Poles and Eveners, Ironed Complete, a Specialty.

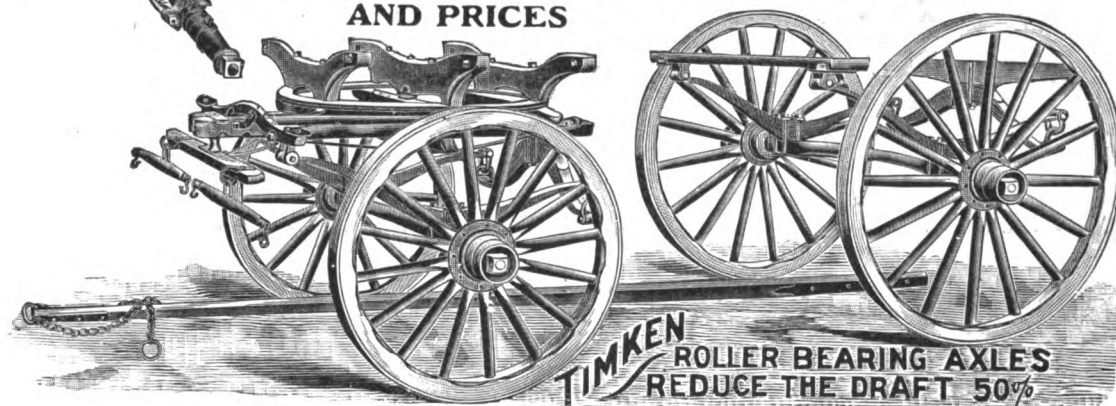
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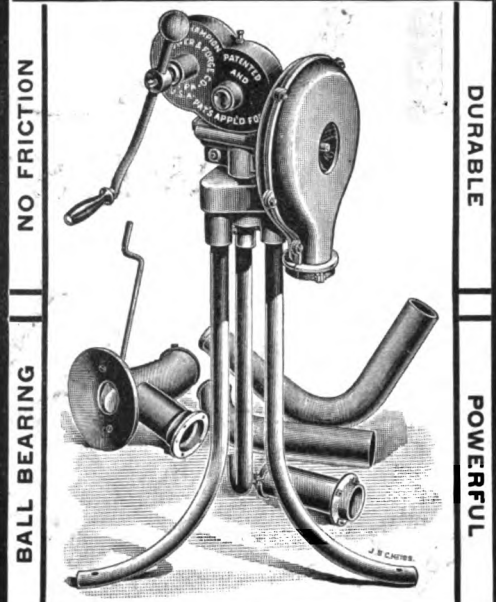
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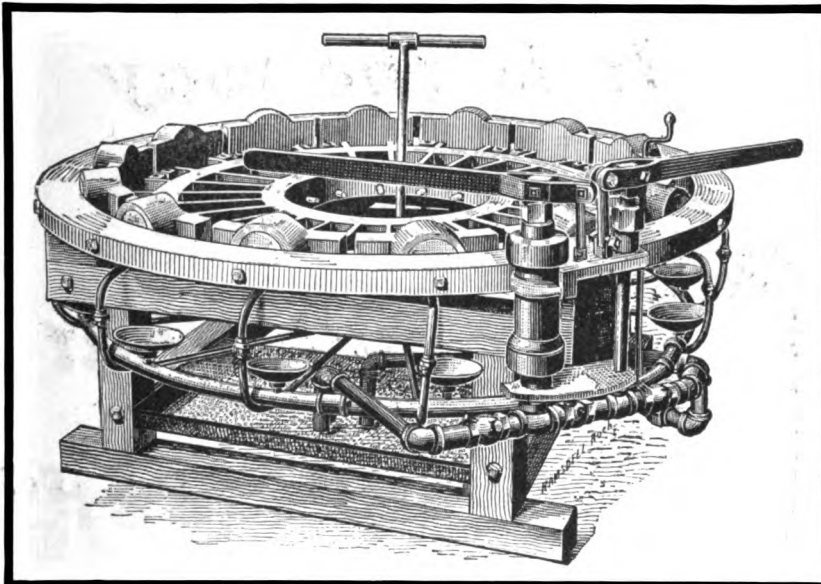
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STEEL BLOWER AND FORGE



They are in high favor. We heartily recommend them, and you lose money every day you are without one. We sell them. Send us your order at once.

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WE desire to call the attention of Blacksmiths and Repair men to the fact that our new "Hydraulic Junior" Hand Tire Setter is now made suitable for handling tires 3/4 inch x 3 inches, and all lighter sizes—wheels 54 inches diameter down to 34 inches and all intermediate diameters, and we shall be glad to furnish particulars as to price and terms upon application from interested persons.

Address
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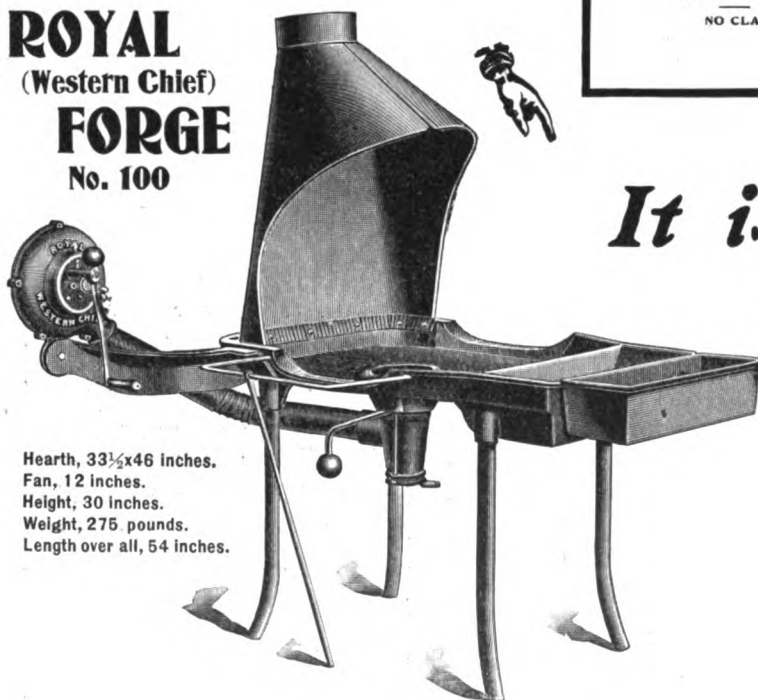
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ROYAL
In Every
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ROYAL
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No. 100



Hearth, 33½x46 inches.
Fan, 12 inches.
Height, 30 inches.
Weight, 275 pounds.
Length over all, 54 inches.

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Our Choice
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America's Choice
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ROYAL FIRE POT
NO CLAY

HANDSOMEST: Because its constructive design is symmetrical, attractive and beautiful.
SIMPLEST: Because fan case and column stand (3 parts only) is about all there is of it.
BEST: Because made of the best material, by the best workmen and best mechanical experience that can be obtained.

SUPERIOR POINTS.

No Belts, no Clutches, no Ratchets.
The blower case oscillates on its bearing, permitting nose of case to point down or out or up, as may be desired; meeting any angle of blow pipe, thereby saving one elbow and 10 per cent. of blast force; besides valuable room occupied by other blowers.
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The gears are Phosphor Bronze and Steel, cut on the most scientific principle; they are flat, and straight cut (no spiral or worm gears); which combined with Steel Shafts and Composition Bearings made and assembled perfectly, run noiseless, and make this the best blower in the world.
The Gear Case is oil tight and dust proof, permitting gears to run in a bath of oil.
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Designed to meet the demands of the most discriminating farrier

In addition to a Large and Complete Assortment of Regular Patterns

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MADE ESPECIALLY FOR HIGH-CLASS WORK

IN THE REBUILDING OF THE BURNED PLANT THE COMPANY HAS SPARED NEITHER TIME
NOR EXPENSE, AND THEIR IMPROVED MACHINERY, COUPLED WITH THEIR LONG
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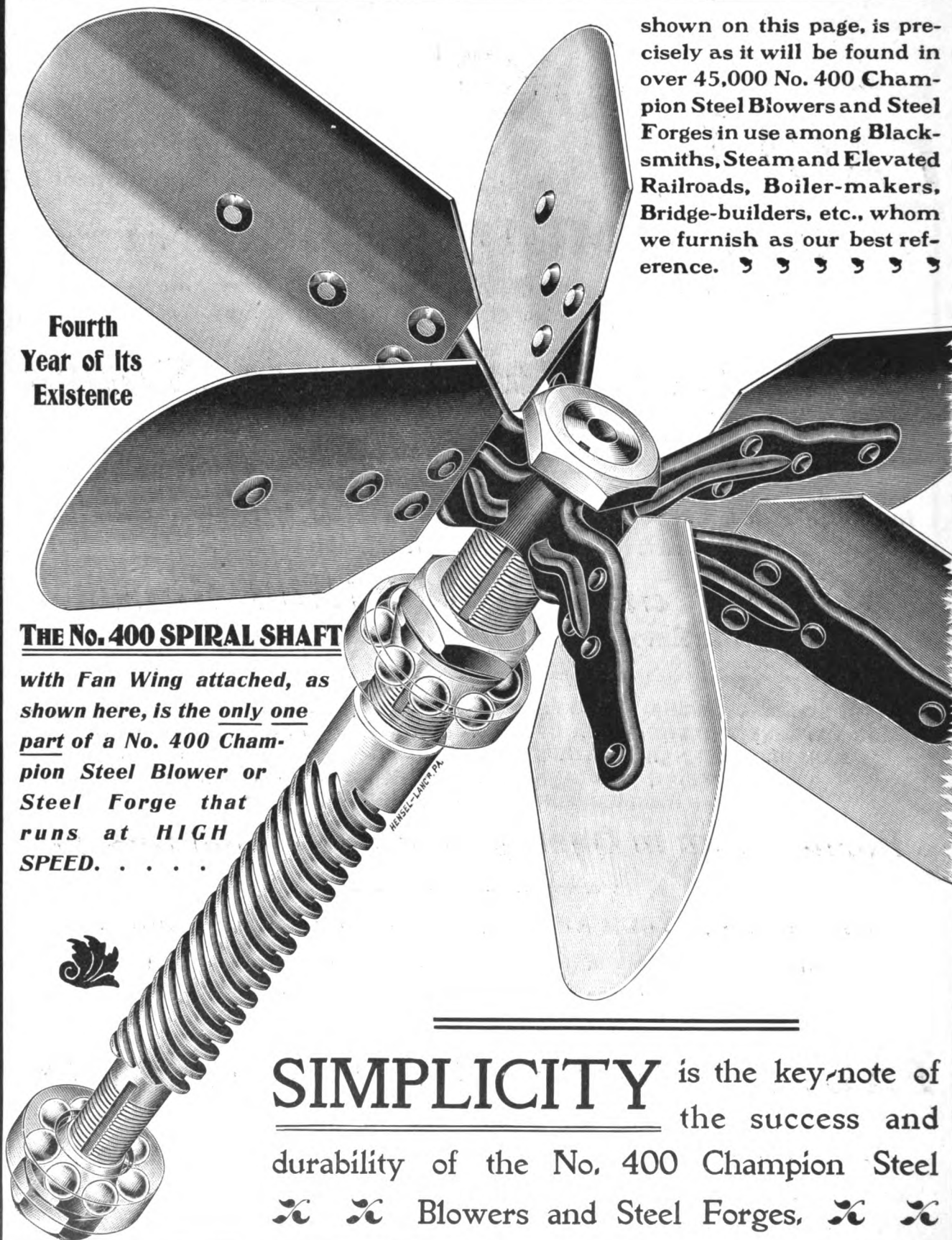
THE No. 400 "SPIRAL SHAFT"

shown on this page, is precisely as it will be found in over 45,000 No. 400 Champion Steel Blowers and Steel Forges in use among Blacksmiths, Steam and Elevated Railroads, Boiler-makers, Bridge-builders, etc., whom we furnish as our best reference. ♪ ♪ ♪ ♪ ♪ ♪

Fourth
Year of Its
Existence

THE No. 400 SPIRAL SHAFT

with Fan Wing attached, as shown here, is the only one part of a No. 400 Champion Steel Blower or Steel Forge that runs at HIGH SPEED.



SIMPLICITY is the key-note of the success and durability of the No. 400 Champion Steel
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In its Fourth Year, with Over 45,000 in Use

The No. 400 Champion Steel Blowers and Steel Forges are now backed by over 45,000 of the staunchest friends the world has ever known. The fact that many of these friends are the mechanical brains of this great and prosperous nation, gives the No. 400 Blower a backing of intelligence that no other tool can boast, and we thus furnish as our best reference, as we always before have done, the great

THE No. 400 BLOWER

in fact, is known not only to all the blacksmiths who have used it, but TO ALL THE JOBBERS AS THE BLOWER WHICH HAS COMPLETELY REVOLUTIONIZED THE BLACKSMITHS' FIRES OF THE WORLD. It is unquestionably the marvel of the century, and there is NO MORE COMPARISON between any other METHOD OF PRODUCING HAND BLAST and that of THE No. 400 CHAMPION, THAN BETWEEN THE OLD MAIL COACH OF THE PLAINS AND THE LIGHTNING EXPRESS OF THE PRESENT. The one is of the Past, the other, the No. 400, is of the Present. The only Blower, in brief, that can meet the high standard requirements of this intelligent age—an age that has never been equaled or even approached, in the matter of mechanical discovery, since the world began.

BY SENDING YOUR ADDRESS

on a postal we will forward you a Souvenir Button of the No. 400 Blower.

U. S. Patents covering the No. 400 Steel Blower and Steel Forges granted June 11, July 30, 1901, and April 15, 1902.

Patent Numbers:
676,322 34,882
676,323 34,883
676,324 34,884
34,880 34,885
34,881 697,629

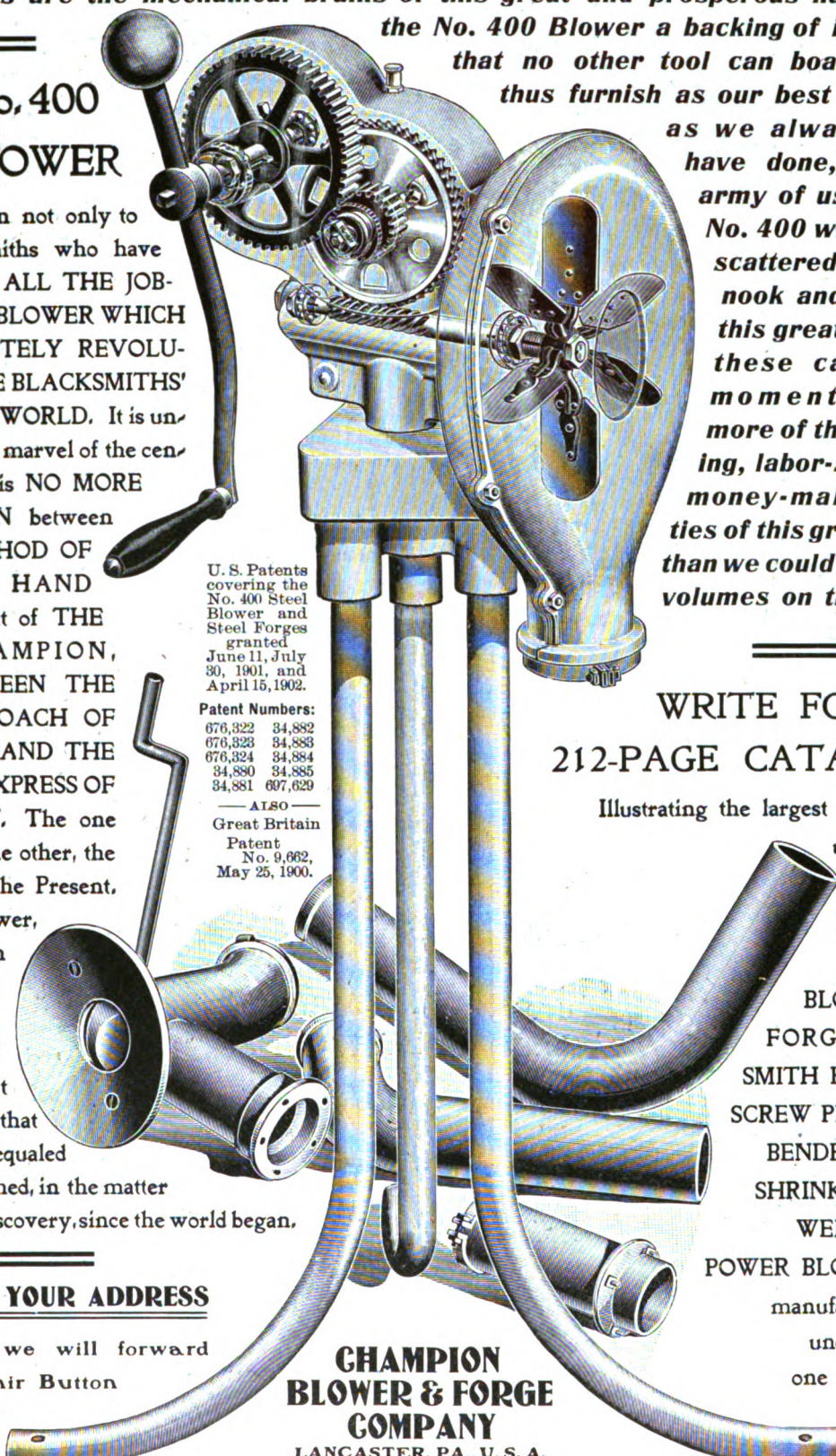
— ALSO —
Great Britain Patent No. 9,662, May 25, 1900.

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BETWEEN "CRESCUS" AND "THE ABBOT"
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Owner, John J. Seaman

"CRESCUS" - Driven by George H. Williams, Union
Record 2:02.14

BOTH HORSES SHOD WITH CAPEWELL NAILS

HOW AND WHY PRINTING IN GEAR WITHIN THE EYE BRINGS TO THE HAY
ACTUAL PORTRAITS OF THE HORSES AND DRIVERS

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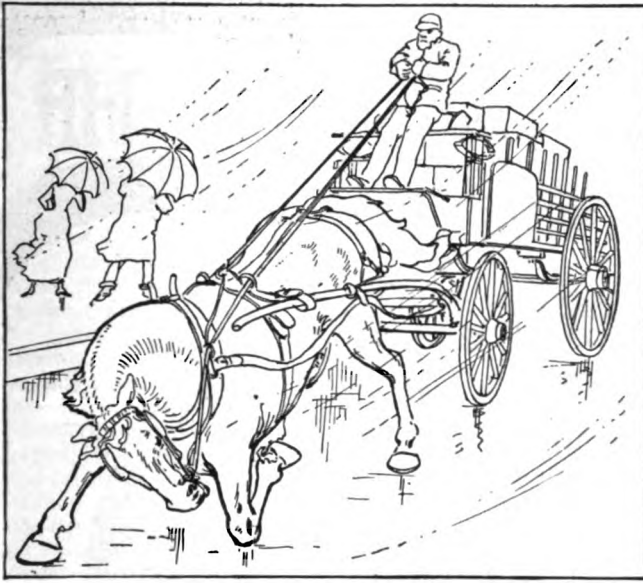
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Hartford,
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1903		JANUARY				1903	
SUNDAY	MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY	SATURDAY	
F. QUAR. 6	F. MOON 12	L. QUAR. 19	N. MOON 27	1	2	3	
4	5	6	7	8	9	10	
11	12	13	14	15	16	17	
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BEST HORSE NAIL
IN THE
WORLD"

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The Quality of Mercy

Most men wish to be merciful. Sometimes they don't know how; sometimes, through ignorance, horses are let slip and suffer. Then owners suffer. It's good business for horse-shoers to help both man and horse ♡ ♡ ♡ ♡

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Shoes already drilled, costing only four cents a set for the drilling—any style,
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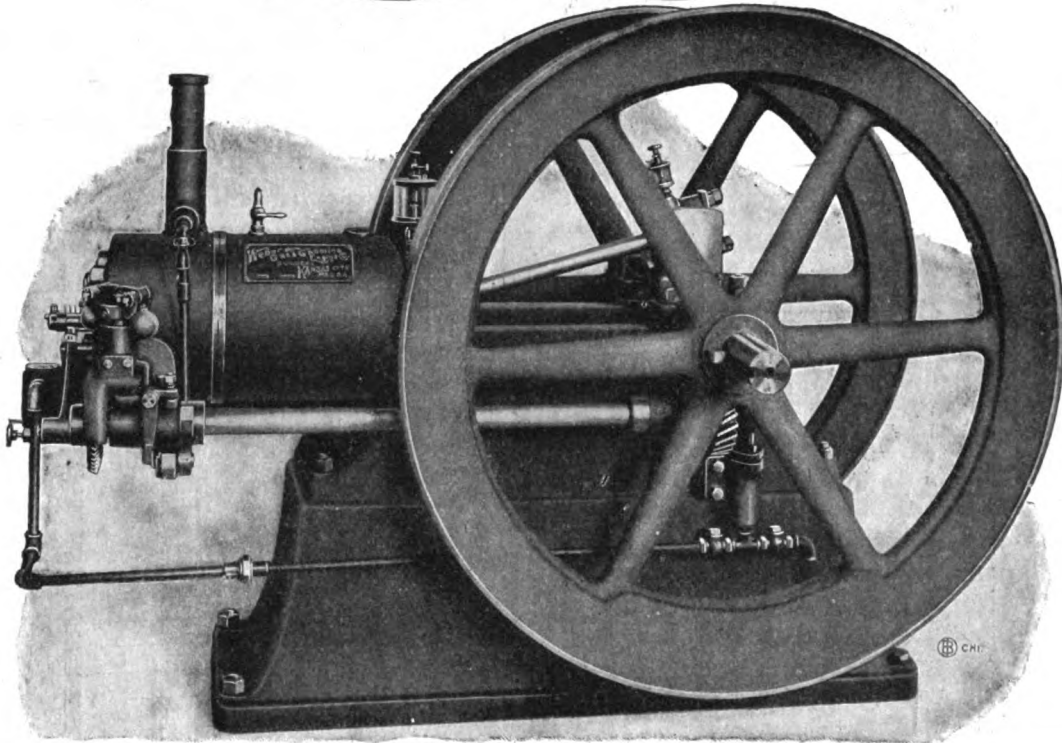
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WEBER

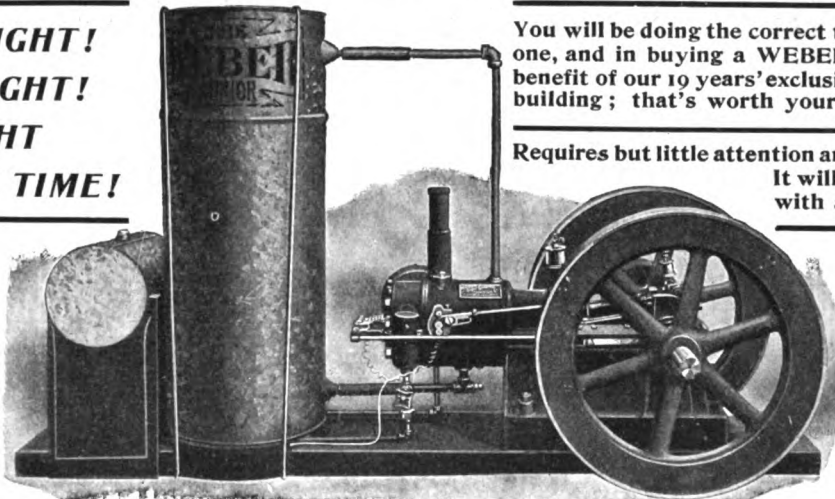
2½ HP



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LOOK RIGHT!
ARE RIGHT
ALL THE TIME!**

SOLID
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SIMPLE
AND
DURABLE



You will be doing the correct thing to put in one, and in buying a WEBER you get the benefit of our 19 years' exclusive Gas Engine building; that's worth your looking into.

Requires but little attention and small space. It will last a lifetime with a little care.

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The 2½ Horsepower WEBER JUNIOR as it appears at work.

Every Engine Sold is an Advertisement.

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Weber Gas and Gasoline Engine Company

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Shipped on Trial, and Sold on Its Merits

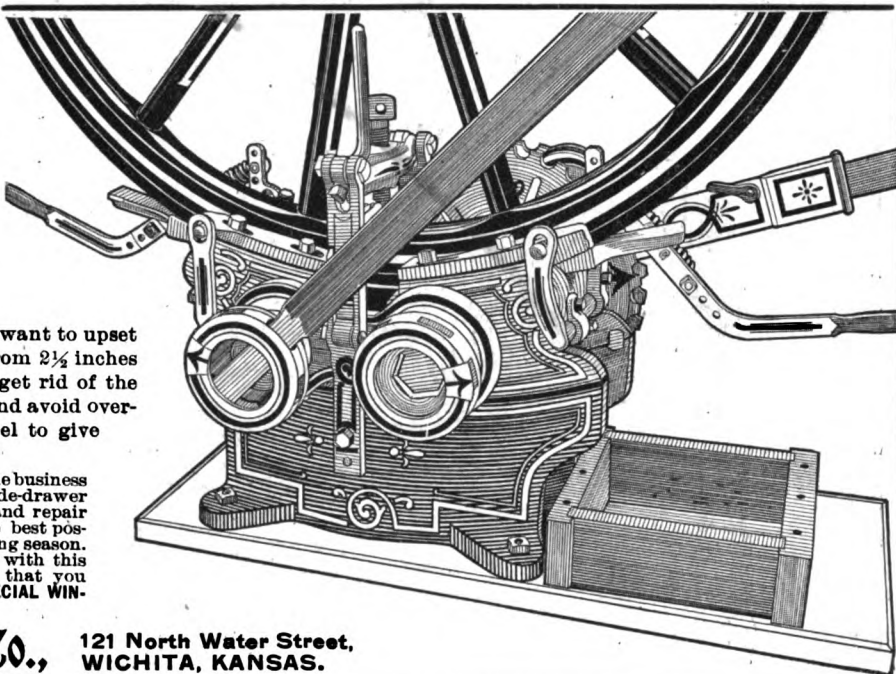
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IS A HAND-POWER MACHINE for setting heavy and light tires cold. It is *not necessary to remove the tire or the bolts*. It is made of a high grade of steel; it does its work very rapidly and without kinking or injuring the tire or metal; it requires but one man to operate it, and it occupies a floor space of only two by three feet. *Less than one-half a minute* is required to adjust the machine from a large to a small wheel, or vice versa, and put a wheel in the machine or to release a wheel and turn it one-half way round, in case you want to upset the tire in two places. It upsets it in from $2\frac{1}{2}$ inches to 3 inches of space. By this means we get rid of the reaction of the whole length of the tire and avoid over-dishing, springing or crushing the wheel to give the desired amount of dish.

This is appreciated by patrons, and it gets the business wherever it is placed. It is the greatest trade-drawer and money-maker ever offered to blacksmith and repair shops. Get one early and put yourself in the best possible position to get the full benefit of the coming season. **IN ONE MONTH** others have made much more with this Cold Tire Setter than it costs; it is probable that you can do likewise. Write us today for our **SPECIAL WINTER TERMS** and **DESCRIPTIVE CIRCULAR**.

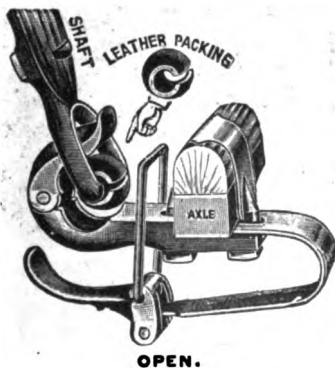
Brooks Tire Machine Co., 121 North Water Street,
WICHITA, KANSAS.



THE BRADLEY SHAFT COUPLING

IS a thoroughly practical, quick shifting, ball bearing, and absolutely noiseless Carriage Shaft Coupling, complete in itself, with no loose parts or pieces, and always ready.

ONE HAND IS THE ONLY TOOL REQUIRED TO OPERATE IT.



OPEN.

It automatically takes up its own wear, and with it shafts and pole may be exchanged in 10 Seconds. It is made entirely of Steel, and will out-wear any vehicle to which it is attached. It has been on the market 10 years, and there are over 500,000 Pairs of them in use. The best carriage-makers everywhere use them. Blacksmiths can make a good profit by attaching them to old or new vehicles. Sold by all jobbers in carriage goods. Printed matter free for the asking.

C. C. Bradley & Son,
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1852
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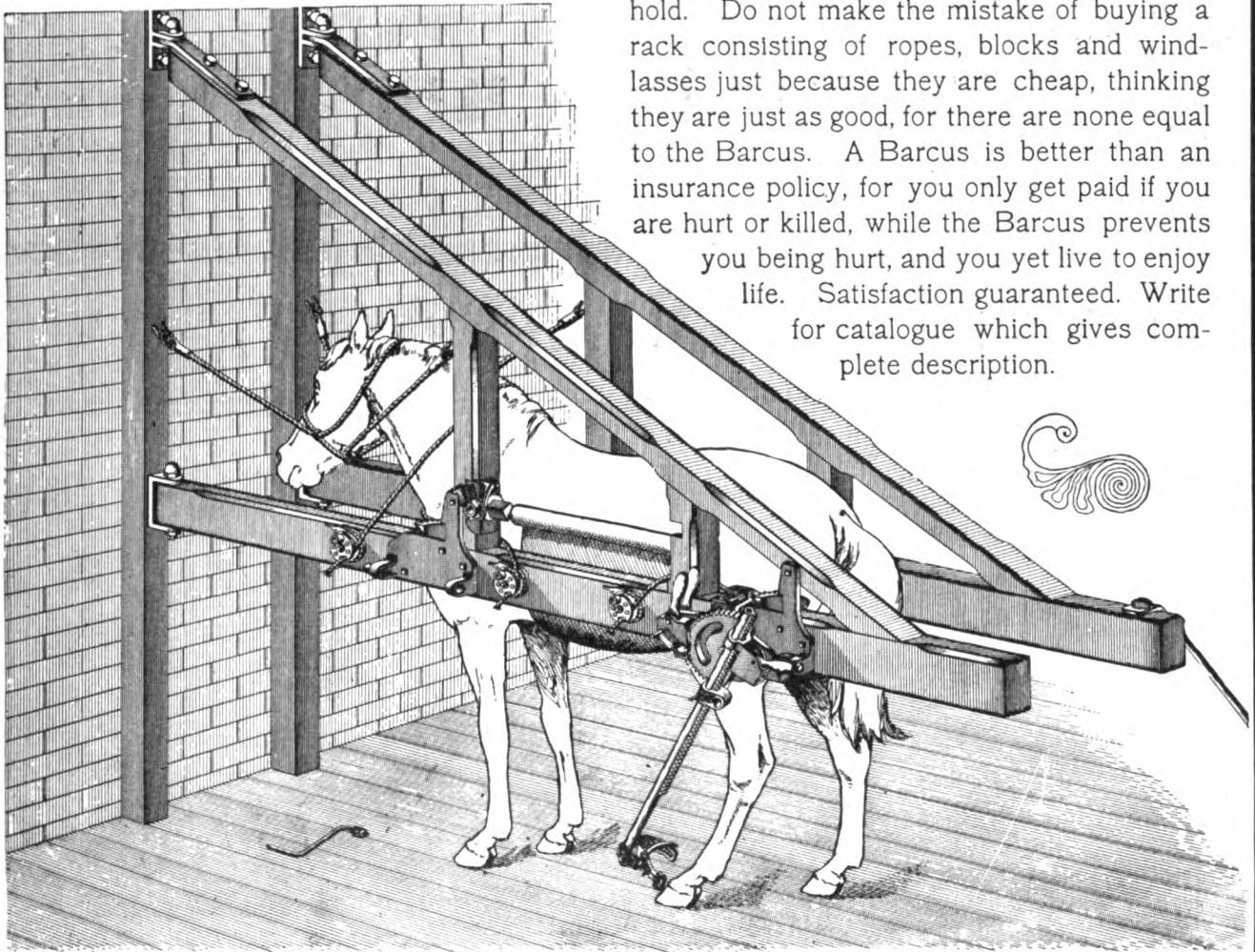
The Barcus Stocks

OVER 500 sold in the last year. The only Stocks that are absolutely guaranteed to hold any horse perfectly without danger to either horse or man. Note the automatic foot clamp just in the act of catching the foot. The blacksmith kindly stepped aside while this photo was taken. In another second he would have had the horse's foot securely fastened: The instant the trip touches the foot the automatic clamp locks itself around the foot, thus holding it securely and firmly. All danger of getting kicked or hurt while fastening a rope or strap, as all other makes of stocks do around a horse's foot, is thus obviated. Can place any foot in any position instantly. Guaranteed not to chafe the foot. Built on the only true and scientific principle. Perfect in every detail. The Barcus Stocks are so much superior over all other kinds, that there is no comparison between them.

PERFECT, RELIABLE AND BEST

machine ever placed on the market for holding and taming vicious horses and mules.

Quickly adjusted, safely operated, sure to hold. Do not make the mistake of buying a rack consisting of ropes, blocks and windlasses just because they are cheap, thinking they are just as good, for there are none equal to the Barcus. A Barcus is better than an insurance policy, for you only get paid if you are hurt or killed, while the Barcus prevents you being hurt, and you yet live to enjoy life. Satisfaction guaranteed. Write for catalogue which gives complete description.



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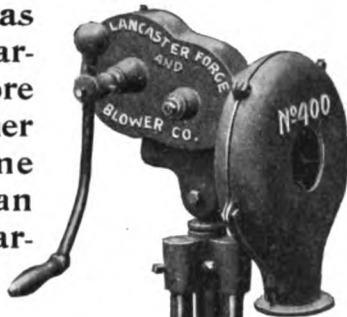
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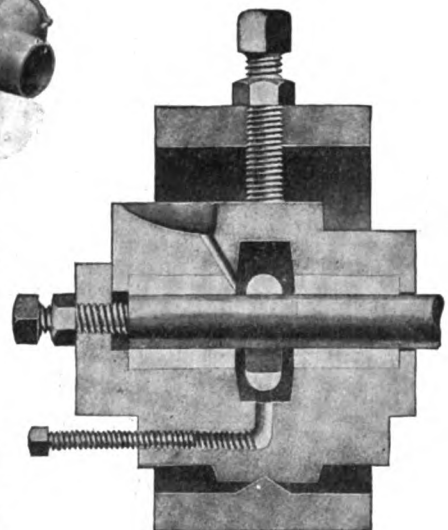
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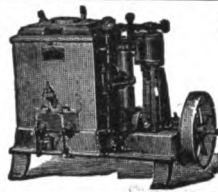
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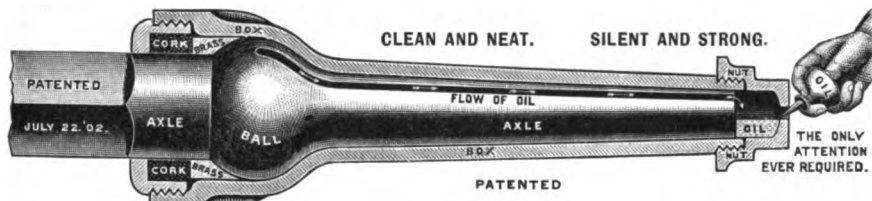
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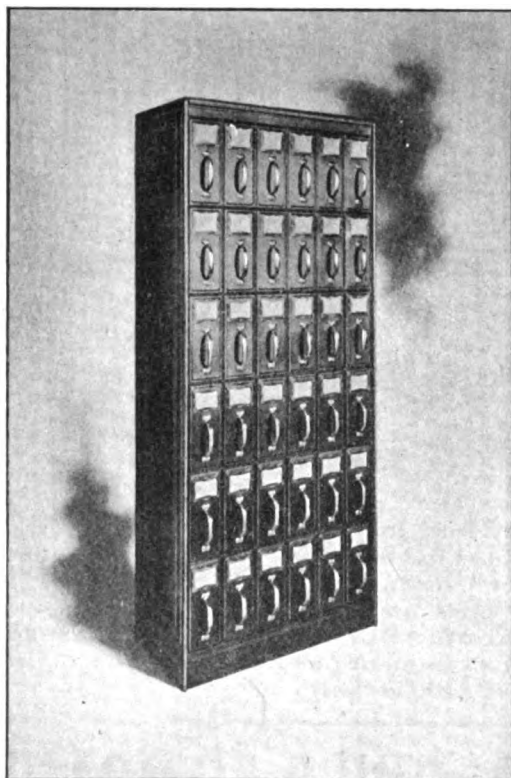
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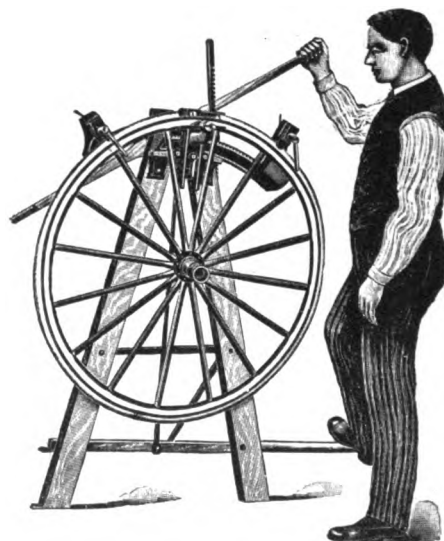
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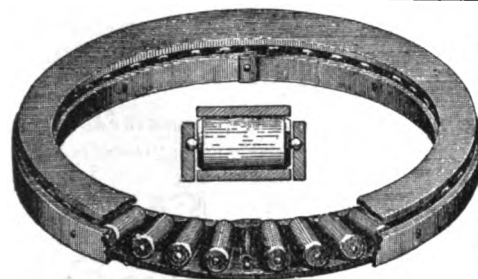


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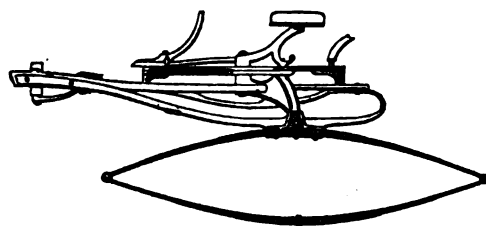


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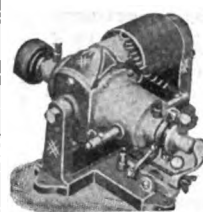
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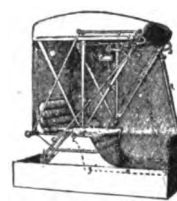
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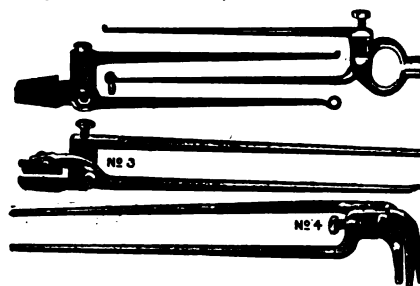
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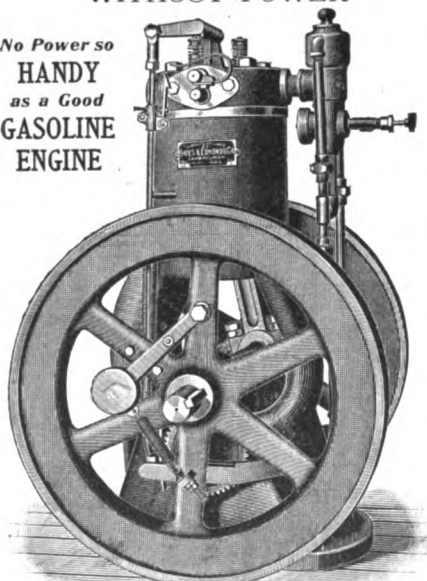
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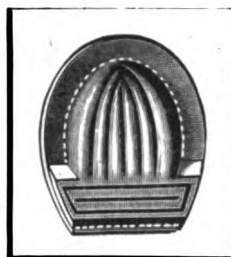
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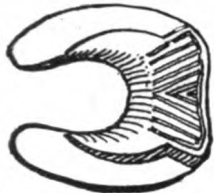
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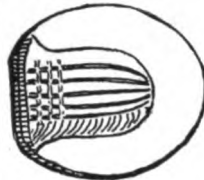
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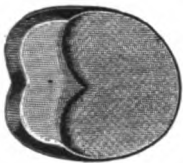
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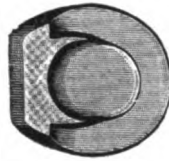


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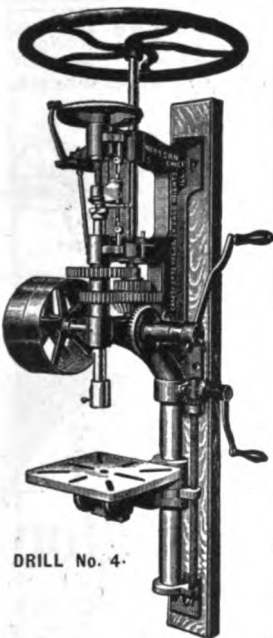
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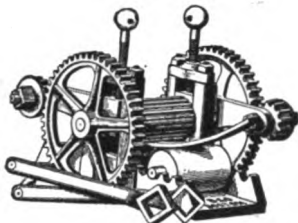
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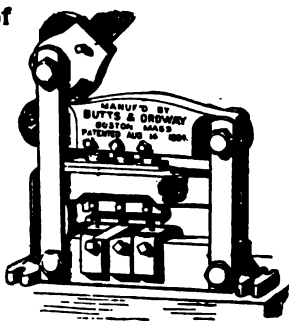
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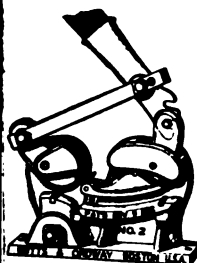


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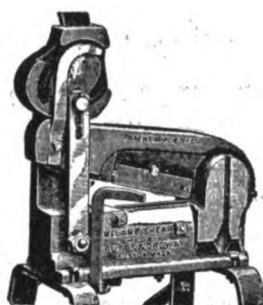
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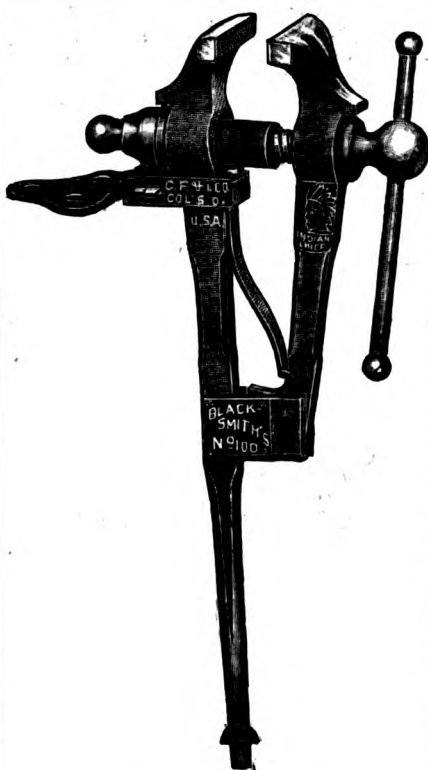
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THE AMERICAN BLACKSMITH

A PRACTICAL JOURNAL OF BLACKSMITHING.

VOLUME 2

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The American Association of Blacksmiths and Horseshoers.

In the December issue appears a brief notice of the ambitious undertaking which is now on foot to secure a number of much needed reforms for the blacksmithing craft all over the country. The movement is one which affects the business welfare, in dollars and cents, of all blacksmiths, horseshoers, carriage builders and repair men, and is being prosecuted on lines which every one of the above craftsmen can sympathize with and support, no matter what his past experience or present views.

As stated on page 57 of the December issue, the primary object of this movement is to secure in every State in the Union a lien law for the craft, which shall, by its working, make it absolutely sure that the craftsman obtains his hard earned pay for every piece of work done. Other trades have similar lien laws for their protection; they secured such protection by direct appeal to their Legislatures. This is what it is proposed to do in the present instance. The newly organized American Association of Blacksmiths and Horseshoers intends to work directly towards the end of enrolling and organizing the

efforts of all interested craftsmen in this movement, and of uniting all craftsmen to bring about the passage of such protective laws by various State legislatures. The force of combined effort is wonderful, and the aim of the Association is to combine and unite towards one end the efforts of the craft, individually and collectively.

As there can be little or no opposition to the passage of such laws, the principal thing to be done is to overcome the inertia of the legislative bodies and set the law-making wheels in motion. THE AMERICAN BLACKSMITH has gladly given its support to this movement in the interest of the craft, and will champion and lend its undivided support to obtaining the beneficial ends in view. It should be remembered, however, that little or nothing can be accomplished without the aid of the craft themselves, who are, of course, the directly interested ones, and if those who are thus widely affected are not willing to expend the small amount of energy which the Association proposes to ask of them, and which is so slight, compared with the advantages to be gained, the movement will hardly be a successful one. We feel, however, from our correspondence upon this subject, that there is not a single person but who would be willing to put forth considerable effort to secure legislation of this nature, and are absolutely certain that undivided support will be given to the American Association of Blacksmiths and Horseshoers. Reference is made to further details following.

A Few Words About Our Contributors.

THE AMERICAN BLACKSMITH is so justly proud of the staff of contributors which write for its columns, that a few words here regarding them may be pardonable.

Mr. E. W. Perrin, who is contributing regularly upon the "Scientific Principles of Horseshoeing," is an eminent farrier of Little Rock, Arkansas, whose thorough theoretical knowledge of the

subject has been supplemented by a wide and very practical experience with the shoeing of horses, both in the English Army, in Canada and in this country. There are few, we are prone to think, who are capable of handling the subject of horseshoeing in all its phases as satisfactorily for our subscribers as is Mr. Perrin, and his series of articles form a valuable contribution to horseshoeing literature.

E. Mayhew Michener, V. M. D., is a veterinarian of wide reputation throughout this country, both as a man of practical ideas and methods, and as a contributor to various publications on the subject of veterinary surgery.

Mr. John L. Bacon, Instructor in Forge Shop Practice, at Lewis Institute, Chicago, Ill., has been writing a comprehensive series of articles upon "Elements of Blacksmithing," which has received wide and favorable comment from many sections of the country, and has in great part led to the adoption of THE AMERICAN BLACKSMITH in a number of colleges and schools where blacksmithing is taught as a text-book upon this subject.

Mr. M. C. Hillick hardly needs an introduction to the readers of THE AMERICAN BLACKSMITH, in view of his wide and almost national reputation as a practical writer upon painting and all allied topics.

Mr. William B. Reid, Foreman Blacksmith of the Repair Shops of the D. L. & W. Railroad, Buffalo, N. Y., is contributing a series of extremely interesting articles upon locomotive blacksmith work, in which we think every one of our readers will find much of great interest.

Another author, widely known in the carriage building field, writes under the modest signature of D. W. M., and gives AMERICAN BLACKSMITH readers some very valuable articles upon subjects connected with the carriage shop and its practical, economical management.

The topic of power in the shop is now a very absorbing one for most shop

owners. The gas engine, its availability and possibilities for the small power user, are treated of in an interesting manner in a series of articles from the pen of "Billy Buntz." We think these articles will be found of very timely interest to the majority of our readers, and especially to those who contemplate adding a gas engine to the equipment of their shop.

It has been the constant endeavor of the publishers of THE AMERICAN BLACKSMITH to secure the very best matter for the reading columns of the paper which it is possible for money to buy, and it is thought that the foregoing list of authorities will prove how far we have succeeded in carrying out this end. We may also add that it will always be our purpose to improve the reading columns of the paper as far as possible, and add to their value to subscribers in every practical way. Suggestions for improvement will always be gladly received.

Turning a New Leaf.

On New Year's Day, the new leaf many of us turn over looks as clean and promising as a new world. We make endless resolutions to keep it just so, but after a short time, it appears as bad as any that went before. The real difficulty, however, generally lies in the fact that the leaves are so much alike.

Considering the years as leaves, the centuries are volumes. These also look very much alike as far as human nature goes. But turn back to the early centuries, when all tools were made from stone by hand, and when the only force was man's unaided strength. Then look at the present century, with its wonderful machinery and marvelous control of nature's forces. We can at once realize the progress, the advancing standard of civilization.

A very grand thing it is to be alive and one of the world's workers in this glorious century still so young. Who can say what the new year will bring? All things seem possible. Living in touch with the great world of progress, and taking its lessons to heart, no man need be afraid of all his pages being alike. Resolutions have a tendency to crumble like the proverbial pie-crust, yet, even the best of us can but do his best. The result will take care of itself. If a man keeps up-to-date, carrying into

practical, everyday life the advanced ideas of his times, the leaf, at the close of another year, may be just as full of blots and mistakes as the one before, but what is written thereon will be of a higher standard, and he will find himself a better developed man.

A Valuable Text-Book of Blacksmithing.

In this issue appears the fourteenth and last article of a series lately written by John L. Bacon, Instructor in Forge Practice at the Lewis Institute, Chicago, Ill. This series, under the heading, "The Elements of Blacksmithing," forms a complete and comprehensive treatment of the subject in all its various phases. Beginning with the



WROUGHT IRON ENTRANCE GRILLE FOR A NEW YORK RESIDENCE.

fundamental principles of blacksmithing, Mr. Bacon takes up systematically and thoroughly every point worthy the attention of his craft. The result is a most valuable contribution to blacksmithing literature.

All the information contained therein is set forth in a plain and understandable manner, so that the series forms one of the best discussions on blacksmithing which we have ever seen. There are few smiths who could not read this series to profit, and the same applies even more to apprentices, helpers and beginners, who are looking to advance their knowledge of blacksmithing in all its fundamental details. For those who have not been subscribers to THE AMERICAN BLACKSMITH in the past, thus missing the benefits of these articles, we are able to make a special offer of the fourteen numbers, December, 1901, to January, 1903, inclusive, for \$1.25, postage prepaid; bound copies, \$2.25. We have a few copies of all these numbers left, and they are at the disposal of any who may wish to

have this very complete series of blacksmithing articles. It may be added that a number of prominent schools and colleges, where blacksmithing is taught, have adopted Mr. Bacon's series as a text-book for the instruction of their students. This only serves to show in what high estimation Mr. Bacon's writings are held.

Ornamental Iron Work.

In modern architecture and manufacture, by reason of its superior strength, durability and neatness combined, iron has gradually crept into the domain of almost every other material. In fact, its uses and possibilities seem endless, and its popularity is yearly increasing.

So much is employed on exteriors that, in order to avoid marring the general effect, it is necessary to make the iron work conform to the style of the structure, or even to add to the effect. Hence, the field for artistic work in iron is very wide, and in no branch of the blacksmith's craft is there such scope for the exercise of skill and original taste.

The accompanying cuts represent two very fine pieces of ornamental iron-work. The first is the wrought-iron entrance grille in residence 353 Riverside Drive, New York City, from the design of the architect, Mr. Ernest Flagg.

The other is a wrought-iron entrance gate to residence 11-13 E. Sixty-second street, New York City, by the architects, Messrs. Haydel & Shepard.

We are indebted for the photographs of these artistic pieces to Messrs. Richey, Brown & Donald, Architectural Iron Works, Long Island City.

Estimating Costs in Carriage Shops.—5.

BY D. W. M.

Aids to Calculations of Cost.

It will be found of great service to weigh the quantities of each size of iron or steel in a vehicle, also to measure the actual amount of plank lumber of each size and kind, as well as to have a list of all pieces used. For instance, if the stay irons on the reach are $\frac{3}{4}$ -inch heavy oval, measure the length of each piece and weigh it. Indicate on your list the number of pieces, and the size and weight of each. A list of all the pieces of timber, wrought and malleable iron, bolts, screws, etc., used on each vehicle, should be kept on the draft of said

vehicle, and on each pattern should be written the thickness and number of pieces.

In the office, it will be found of the utmost service to have a cabinet with sufficient pigeon holes or boxes in which to keep all quotations of prices, and all estimates. These may be suitably indexed, alphabetically, or by number. One may contain all prices on wood work, another on iron, another on trimming goods, another on paints; or subdivisions of these may be made. Separate boxes should contain estimates on cost. With these for ready reference, one should be able to figure accurately and quickly. It takes some time to get all this together; but no better investment can be made.

The circular or catalogue received almost daily is frequently thrown away. If it relates to anything connected with the business, even remotely, the better plan is to keep it, and have a place where it may be referred to readily. The ordinary box file will be found useful for this purpose. Once a year they may be weeded out. The same system should prevail with copies of trade journals received, which often contain the very information you want, and for lack of which you must suffer some loss.

There are many business men who conduct their offices as though they were afraid of knowing too much about their business. Many keep no books, and have but little system, yet they are successful. They figure everything in their heads. They pay the best prices for the most skilled labor, and do not seem to care what the cost is, but by having the very best article to sell, they ask and get the highest price. There are others who have everything in the way of system; figure the cost of everything to a cent and sell at the bottom price, yet they make no money. The man with system, simply has his business well in hand; and if he will make the best goods and get the best

price, he can drive his business and develop it on safe lines. At the end of the year it is of the utmost helpfulness to know where to push strongest the next year for profit, and where to avoid loss. This cannot be done without system, and correct estimates backed up and proved by the actual cost items, as shown by shop and office returns.

One other item,—a business man should pay himself a salary which should figure in the cost of running the business. He is worth just the same as any employee.

New Year Suggestions.
As Applied to the Carriage Paint Shop
and the Painter.
M. C. HILLICK.

January, of all the months in the year, affords the jobbing shop painter the best opportunity for balancing the

anticipation of plenty of work in the near future.

Perhaps your book-keeping system is obsolete, or maybe—but we sincerely hope this does not apply to your case—you have failed to keep a set of books, trusting to luck and random entries in a pass-book carried in the pocket, to keep the business from becoming entirely lost in a wide waste of ill-remembered events. If this has been your experience in the past, why not reform, and once and for all time inaugurate a complete, comprehensive and accurate system of book-keeping?

Perhaps you have been a bit negligent in the matter of making estimates upon work submitted, and in your eagerness to keep it from your competitor, detailed items of cost have been ignored, and figures jumped at, only to be found,

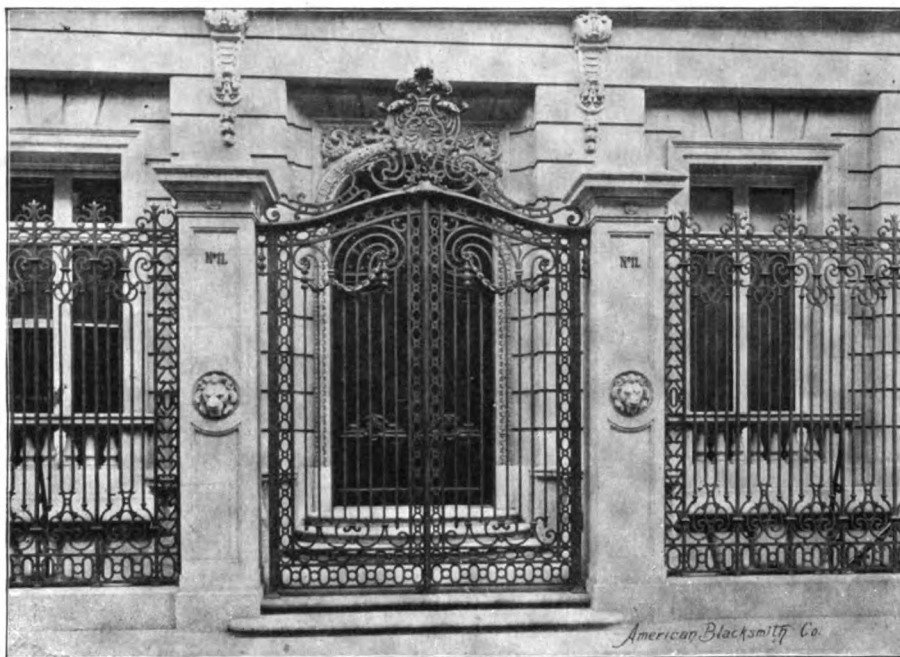
later on, misleading and disastrous in effect. If this has been your experience why not institute a second reform?

It has been said, and with much accuracy, that there is no royal road to estimating. In this age of remorseless competition, an estimate should be based upon hard, close figures, carried out to the exact length of every least detail.

The writer recently inspected an estimate made by a certain manufacturing concern

upon the cost of putting certain repairs upon a railway coach, which was complete, even down to the expense attached to drawing a stripe across a transom glass! A carefully and fully computed estimate upon the cost of labor and material to be expended in painting and finishing a certain vehicle takes the contract, if secured, out of the game of chance, and converts it into "a dead certainty."

Possibly you have hitherto set too small a store upon the importance of shop conveniences, by which we mean labor-saving devices, roominess of apartments, light, ventilation, equipment for getting work into the shop, etc. Why not give all these things



SOME HANDSOME ORNAMENTAL IRON WORK.

books, getting at the profit or loss of the year's business, and making preparation for the increased trade which he may hope to win during the approaching season.

No year, be it ever so successful, is quite free of disappointments and mistakes, and it is the man wise in his day and generation who is able and willing to profit by these mistakes. So, early in the youth of this present year, it is a step forward in the direction of a larger and more profitable business, to look close into the details of the business that has passed into history, to try to make amends for the shortcomings of previous years, and to build securely in

especial thought just now? If such conveniences are of value to the large shop they are proportionately of equal value to the small one. The same kind of conditions make profit in the shop of modest pretensions as give the city shop, with its millionaire clients, a sure money-making power. Plenty of room is a first essential in the paint shop. Lacking this, the painter is struggling under a severe handicap. The blacksmith or the woodworker can work more advantageously in restricted quarters than the painter. Freshly painted or varnished work cannot be stored closely without injury. The roomy paint shop, other things being equal, is the best paying shop. Plenty of light is no less essential than plenty of room. Light not only facilitates work, but it actively promotes the drying of paint and varnish.

To illustrate: Note how much quicker a freshly laid coat of roughstuff, paint, or varnish, on the side of a carriage body next the light, dries, than the same material on the side away from the light. The ablest chemist that France has produced, making a specialty of varnish problems, declares that light, with but one exception, contributes more powerfully to the drying of varnish than other agencies. Hence the advice, make the paint shop, including varnish room, as light as possible. And after light, ventilation.

Ventilation—in other words, pure, fresh air—prolongs the painter's life, contributes to his comfort in working, and quickens the process of drying of paint and varnish. The imperfectly ventilated paint or varnish room carries gases and impurities in the atmosphere, which greatly retard the drying of paints, colors and varnishes. They carry disease into the human system. They serve to cripple the painting business from all points of view. Equip the shop with a ventilator for every room. Failing to do this, arrange to lower all windows from the top. Arrange some device with which to furnish the shop with a full supply, daily, of fresh, wholesome air. You admire the mirror-like surfaces released from the high class factory shops, and wonder how such surfaces can be kept so clean.

Clean rooms and clean surroundings help amazingly in this attainment. As a rule, ill health does not exist in clean quarters, nor are specky, dirty surfaces developed there. Keep the paint shop clean and increase its profit-earning capacity.

Some buyers of paint shop supplies mistake the importance of their business, and buy an inferior class of materials because the price is fashioned into an alluring bait. Price is only the means by which the goods are obtained. It does not necessarily indicate the quality of the goods nor define their cheapness to the consumer. The paint or varnish quoted at the lowest figure may, at the final reckoning, prove by far the most expensive. Quality, regardless of price, determines the value of what the painter has to buy.

business, which must be taken into consideration at the present time. The paint shop hermit is, to-day, a trade outcast—to-morrow, a nonentity and forgotten. Publicity is indispensable—publicity by postal card distribution, by handsomely arranged signs for country roadways, by advertisements in the leading local papers, and by a high grade quality of work, which is, after all, a kind of publicity second to none, and of ever increasing value.

How a Gas Engine Runs.

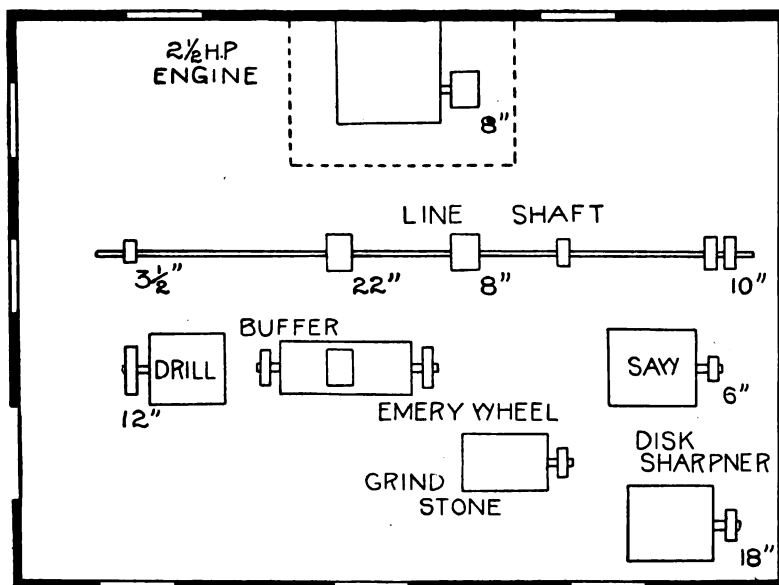
BILLY BUNTZ.

The gas engine came into existence some 200 years ago through experiments made with gunpowder. Were the propulsive force occasioned by the discharge of a gun confined within the barrel and used to force a piston, the

operation would be practically the same as the ignition of gas in the cylinder of a gas engine. The combustion chamber is provided with a valve, through which the gas is drawn by the piston. The piston also compresses the gas, after which it is ignited, and the concussion used as a direct force for pushing the piston forward. The burned vapor then escapes through the exhaust valve.

Kerosene, products of crude oil, natural gas, city gas, etc., may be used as fuel, although gasoline is generally preferred.

A few people fear that a gas engine might explode, whereas, when it is understood that only a few drops of gasoline are vaporized at a time, the uninitiated will comprehend that there is no more danger from a gas engine than from a gasoline stove. Only when gasoline is carelessly admitted to the open air in considerable quantity and formed into gas is there any danger. On the gas engine, the vaporizing of the gasoline is done either within the iron walls of the cylinder, or in a small chamber called a "vaporizer" or "mixer," so that no fumes reach the open air. In fact, it would be only through the most criminal carelessness that any damage could result, so closely is the gasoline confined. Even a Simple Simon could run a gas engine without danger of being "blowed up," and



PLAN OF SHOP OF PIRTLE & SMITH.

Forehandedness in buying, that is to say, ability to pay cash, or discount all bills at 30 days, is an exceedingly important factor in making the paint shop pay. The saving from this one line will alone go far toward paying rent of shop, fuel, and other necessary expenses.

At this time, and during the next few weeks, is an unusually favorable opportunity for making a general acquaintance with vehicle owners and users located within the outreach of your business. Sociability, good fellowship, or, if you please, a touch of human brotherhood, is a wonderful uplift in making the painter an appreciated and much valued man among men. This getting acquainted with the trade, and at the same time making a canvass of vehicle equipment needing repairs, is a strictly legitimate part of modern

therefore it is frequently called "Fool-Proof."

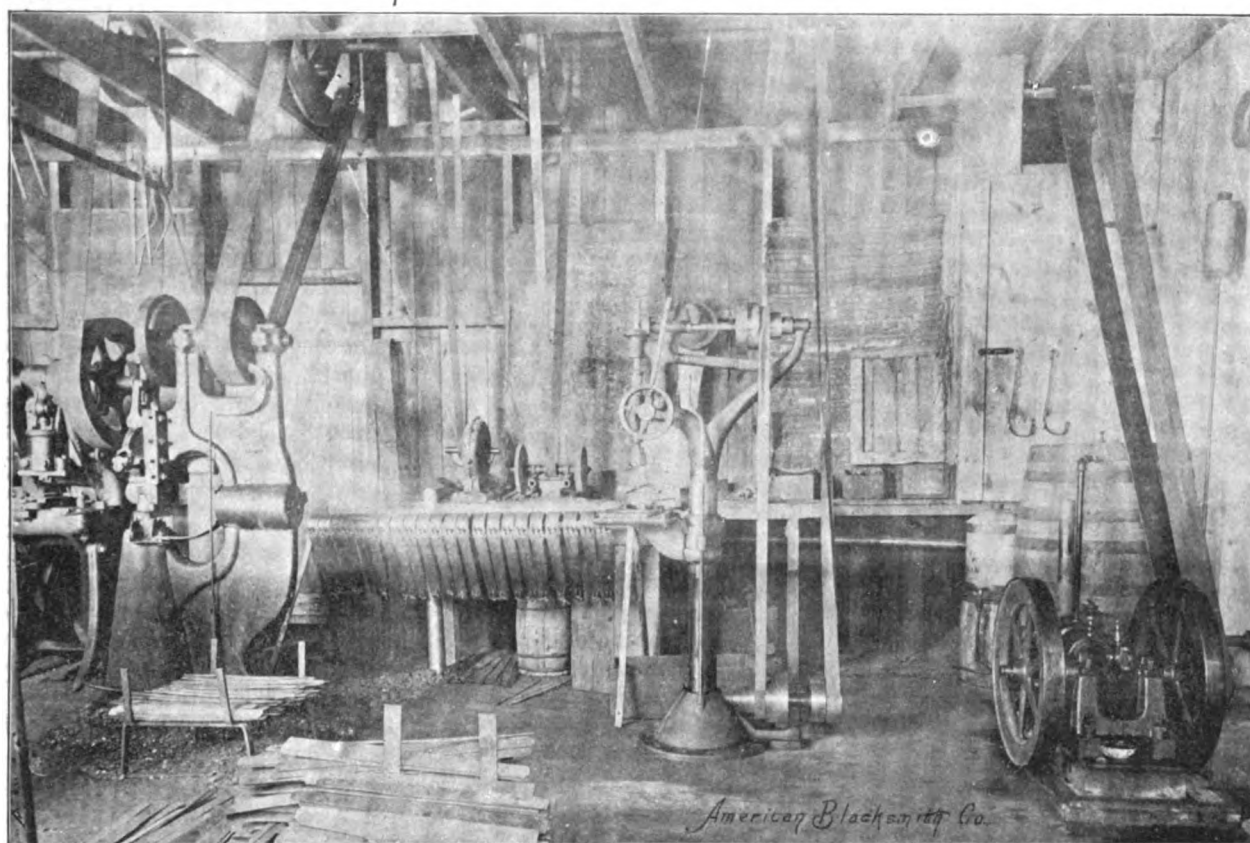
In construction, the gas engine is merely a cylinder mounted, or cast upon a base and provided with a piston, connecting rod, a crank, and a pair of balance wheels for steadying and retaining the motion. Power may be taken from the balance wheel shaft by a gear, pulley or clutch, or the shaft may be direct-connected to a machine.

The best gas engines have a perfect means for vaporizing the gasoline, which renders them economical in the use of fuel. A good engine also has a strong crank and connecting rod, balance

The cylinder of a gas engine is water-jacketed to prevent it from over-heating. A small tank or barrel holds the water, which flows through the jacketed cylinder and flows back to the tank because of its heat, and is used over and over again, even though it does become heated from its repeated circulation through the jacket.

To give the reader an idea of how a shop looks when driven by a gas engine, the factory of John Donnelly, of Brandford, Conn., is here illustrated. Mr. Donnelly is making a specialty of manufacturing linemen's climbers. He says his line shaft is 24 feet long, and is

& Peck, of New Haven, Conn., made a hard coal forge to order for Mr. Donnelly, the same being next to the power press. He says his trip hammer is the well-known "Little Giant," manufactured by Mayer Bros., at Mankato, Minn. This is a much more convenient hammer for the smith shop than those operated by a steam cylinder or compressed air cylinder, and is especially adapted for being driven by a gas engine. It has a 50-pound hammer head, which runs in a steel ram channel, thus assuring accurate work. The ram, being of cast steel, prevents any possibility of breakage. The dies are of



THE WELL EQUIPPED FACTORY OF JOHN DONNELLY, BRANDFORD, CONN.

wheels with heavy rims, a sensitive governor and a reliable igniter. Igniters which are operated by means of electricity are the best, the sparker being set so that the ignition of the gas in the cylinder occurs at the proper period of the stroke of the piston. If the ignition were to occur too early or too late, the piston would not receive the proper force. With the electric igniter the engine can be started at once, by simply turning on the switch which regulates the electric current. With the tube igniter, which is the oldest means of igniting the gas, it is necessary to wait a couple of minutes for the tube to heat before you can start up.

driven by a Weber Junior 2½-horsepower gasoline engine, which furnishes sufficient power for driving all the machines at one time, although, as a rule, he has use for only two or three of them. He says the gasoline consumption is only 2½ gallons in ten hours. He has mounted the engine on a masonry foundation and uses a barrel for the water.

Mr. Donnelly says that his blower is a small one, just right for two fires, and was made by the Buffalo Forge Company, Buffalo, N. Y. The power press, shown in extreme left-hand corner, was made by The Ferracute Machine Co., of Bridgetown, N. J. Miner

tool steel, hardened, and may be obtained in sizes suited to a special work. This hammer will forge stock 2 inches square, 2½ inches round, and flat iron up to 4 inches wide, without any adjusting. The blows are controlled by a tread, so that a light or a heavy blow may be struck simply by a slight movement of the foot, while the patented connection of the hammer head renders an easy, elastic movement. The drill press is a small one, especially adapted to his work. Altogether, Mr. Donnelly has a well equipped shop of which he may justly be proud.

Pirtle & Smith, Wilsey, Kansas, state that they are using a 2½-horsepower

gasoline engine, doing a general class of plow and wagon work. They use the emery and polisher shown in the accompanying figure, at the same time starting the engine as jobs come in, and shutting it down when power is not needed. Often it is started 25 times a day. They say they have ground and polished more than ever, since using the engine, and at one-half the expense and one-tenth the labor. One day they drilled and countersunk five sets of crucible steel cultivator rivets in 40 minutes with ease, while the same work by hand is hard labor and would take twice as long.

The engine sits in a dust-proof room, 8 by 8 feet, and is fastened by four $\frac{5}{8}$ -inch bolts to a solid rock foundation, 28 inches wide, 5 feet long, 11 inches thick.

To Forge an Eye.—A Good Way to Make a Wood-Splitting Wedge.

BRICE E. PEARSE.

The following is a good method of forging an eye for chain-hooks, braces, eyebolts, etc., when the whole strength of the rod is wanted in the eye:

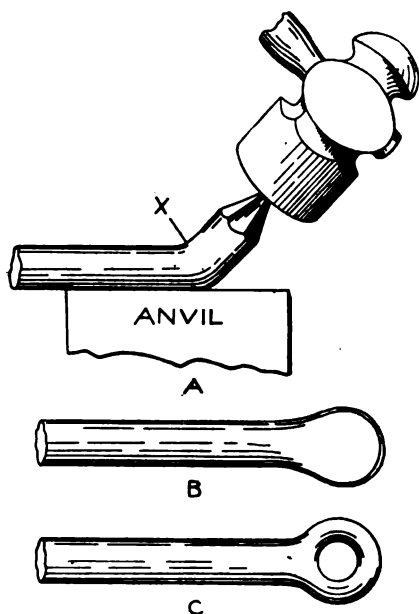


Fig. 1. FORGING AN EYE FOR CHAIN-HOOKS, BRACES, EYEBOLTS, ETC.

Take a soft heat on just the end of the rod (using a hammer of good weight), point it a little, and bend down over corner of anvil. Next turn the point up and strike as in Fig. 1, A, so as to upset the bent part down even with the rod, as in Fig. 1, B. Take care not to get a cold shut. Turn it over and punch as quickly as possible, rounding up on the horn of anvil.

With a little experience, you will make a good, strong job, and at one

heat, too. (Fig. 1, C, shows the eye complete).

To make a wood-splitting wedge, take a piece of steel $1\frac{1}{2}$ inches square and $3\frac{1}{2}$ inches long, draw out the bit first with fullers, leaving it a little wider at

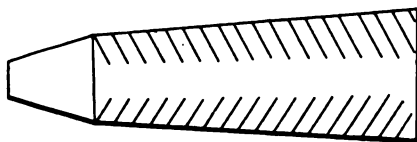


Fig. 2. A HOME MADE WOOD-SPLITTING WEDGE.

the thin end. Next, draw down for the head to about 1 inch square. An octagon makes a nicer looking job. It will stand much more, and wear longer than if left the full size of stock, for the corners will not split down and fall off as they do in a large-headed wedge. Last, but not least, cut a row of teeth the entire length of the wedge, either by holding in the vise or laying on a block of lead or hard wood.

Woodchoppers say that the teeth make no perceptible difference in driving, and that the wedge sticks very much better, seldom splitting even in frozen wood. The wedge complete weighs about three pounds, and appears as in Fig. 2.

A Special Subscription Offer.

In order to stimulate interest in THE AMERICAN BLACKSMITH, and to increase its subscription list at even a more rapid rate than it has been growing in the past, we have made a special arrangement to offer a remarkably fine prize in a new subscription contest, which is announced for the first time in this issue, and which is fully outlined on one of the advertising pages. Before describing this further, we wish to mention the prize of \$10.00 cash, which was recently offered to the person securing the largest number of subscribers to THE AMERICAN BLACKSMITH before April 1, 1903. This prize will be awarded in addition to the premiums or commissions given for such new subscriptions. Reference is made to our premium offers among the advertising pages. Although the competition is very brisk, a relatively small club of from thirty to fifty new subscriptions will undoubtedly win this prize.

The new prize subscription offer which we now make is as follows: To the first person whose total number of

new subscribers sent to this office amounts to one hundred, we will give free a fifty-dollar Scholarship in Blacksmithing and Forging in the International Correspondence Schools of Scranton, Pa. This scholarship is complete with all the books, literature and service which accompanies such a course. The International Correspondence Schools are well and widely known all over the country. The opportunity which we offer here to obtain a thorough course on these subjects in return for a little enterprise is a remarkably fine one, and we hope that many will take advantage of our offer to enter the contest. All those who intend to try for this prize must signify their intention of doing so, on or before April 1, 1903.

For those who expend their energy in competition for this prize, and do not succeed in winning it, we propose to offer a reward, as we do not desire any one to labor in our behalf without receiving some compensation. We will allow a liberal cash commission for all subscriptions obtained by those who do not secure the prize in question. The opportunity offered is an excellent one for obtaining a fine course of home instruction at no expense, and we feel sure that a large number will take advantage of it and enter the contest.

A Novel Piece of Mail Matter.

The world is usually ready to give credit for originality wherever it crops out. We cannot refrain from making mention of the novel piece of mail matter, which reached us the other morning, and which is illustrated in two of the accompanying engravings. The date, however, does not refer to the time of mailing. This parcel was sent to us in exactly the shape shown, with



A NOVEL PIECE OF MAIL MATTER.

no other coverings or tags, and was from L. S. Cleveland and Son, Onondaga, N. Y., in payment of their subscription to THE AMERICAN BLACKSMITH. Views of their shop are also shown here.

Considering the many hands through which mail matter passes, and hence the

divided responsibility, we would not advise our subscribers to adopt this



SHOP OF L. S. CLEVELAND & SON, ONONDAGA, N. Y.

method of remitting, if they desire the money to reach this office with certainty.

The Elements of Blacksmithing.—14.

JOHN L. BACON.

Instructor in Forging, Lewis Institute, Chicago.
Materials Used in Forge Work.

For intelligent working in iron and steel, some understanding of their chemical nature and method of manufacture is necessary. For convenience sake the irons and steels ordinarily used in the forge shop may be divided into three general classes, viz.,—wrought iron, machine, or soft steel, and tool steel. Cast iron should also be considered as being the base product from which the above are commonly made.

We may consider the metals simply a compound of pure iron and carbon. The amount of carbon the compound contains determines the ease with which it can be hardened. Thus a compound having a very small amount of carbon can scarcely be hardened at all; one having 1% carbon hardens at a comparatively low heat, and one with a little less, say 0.8% carbon, will harden at a higher heat. These compounds are made up in about the following proportions:

Cast Iron,	about 3% carbon.
Machine Steel,	0.2% to 0.5% carbon.
Wrought Iron,	0.0% to 0.3% carbon.
Tool Steel,	0.8% to 1.2% carbon.

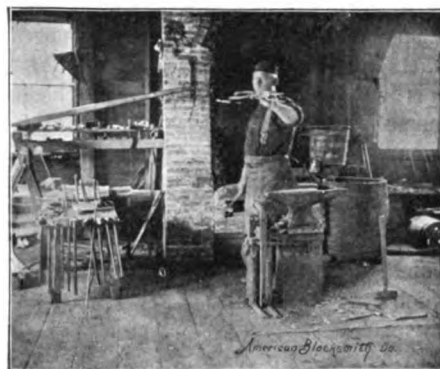
The percentage of carbon given in each case above is about the average, though it may run higher or lower in particular cases. There is always present, in addition to the iron and carbon, a small percentage of manganese, silicon, phosphorous and sulphur, but for our present purpose we may neglect these and consider the metals as compounded of carbon and iron alone.

It will be noticed from the above that wrought iron and machine steel are almost the same, chemically, that is, we might have a machine steel containing 0.2% carbon and a wrought iron of the same amount of carbon. But as wrought iron and machine steel are two materials having very different qualities, there must be other distinctions. The main difference between wrought iron and machine steel lies in the fact that wrought iron contains a small amount of slag, found in the bars in the form of long drawn out, minute streaks, giving the iron a fibrous structure. Steel does not contain this slag and has a granular structure. This difference of structure and all the different properties arising from it are due entirely to the different methods of manufacture.

It will be seen from the table that cast iron contains about 3% carbon, while wrought iron and machine steel contain about one-tenth that amount. To make wrought iron or machine steel then, it would seem only necessary to remove some of the carbon from the cast iron, and in most cases this is exactly what is done. In making both wrought iron and machine steel (the "open hearth" steel used in forge practice) the processes are almost exactly alike, the difference being in the temperature at which the metals are worked. In both cases a furnace something like Fig. 116 is used. The sketch shows a lengthwise section through the center. At A is the fire place, at B, the puddle or hearth, and the stack or flue at C. The flames on their way to the stack are deflected by the roof of the furnace upon the melted iron lying on the hearth. The iron is thus brought under the influence of the flames without being in direct contact with the fire.

oxygen in the flames. This oxygen, as well as the oxygen from the hammer scale or iron ore, gradually burns out the carbon from the iron. The melted mass is constantly stirred in order to expose all parts to the influence of the flames.

Now the more carbon contained by iron, the lower the melting point. Hence, cast iron will melt at a much lower temperature than wrought iron.



INTERIOR VIEW OF AN ONONDAGA SHOP.

A temperature just high enough to melt cast iron will leave wrought iron merely in a pasty condition.

When making wrought iron, as the carbon is burned out of the metal, the temperature of the furnace is kept at about the melting point of cast iron. As the carbon is burned, the metal gradually stiffens and becomes pasty, and at the completion of the process is worked up into balls which are then taken from the furnace and rolled or hammered into bars. There is more or less slag with the iron in the puddle. A part of this slag is squeezed from the balls, but part of it remains in small drops all through the mass, and as the balls are drawn out into bars these small drops lengthen out and form the minute streaks mentioned before. It is these

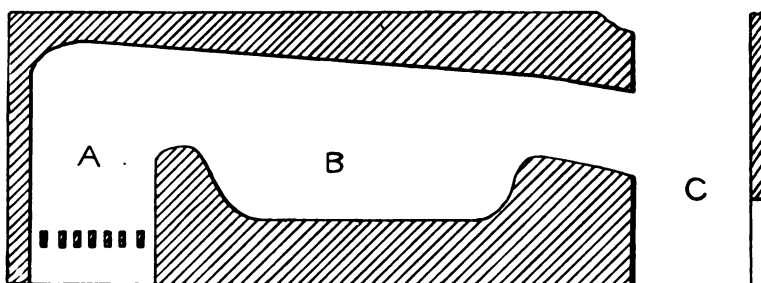


Fig. 116. LENGTHWISE SECTION OF A FURNACE USED IN MAKING WROUGHT IRON OR MACHINE STEEL.

Cast iron together with hammer scale, or some other oxide of iron, is placed upon the hearth and melted down. The fire is then so regulated as to give an oxidizing flame—that is, more air passes through the fire than can be properly burned, leaving a surplus of

small slag seams that give wrought iron its peculiar fibrous structure.

When machine steel is made, the temperature of the furnace is high enough to keep the metal liquid during the entire process. In this way the slag floats to the top of the iron and

does not remain mixed with it. After sufficient carbon has been burned out of the iron, and while the metal is still in a molten condition, it is drawn off underneath the slag, cast into ingots, and later rolled into bars. This gives the steel a granular structure.

The presence of slag in the wrought iron makes it more desirable than steel for certain kinds of work. On the other hand, every one of these minute slag seams is a source of weakness, and when the iron is hammered too much, it is liable to crack along one of these seams. Steel, not having these slag seams, is not so liable to crack when hammered. Thus when a great amount of forging is necessary, machine steel is a more suitable material than wrought iron. Wrought iron, however, welds much more easily on account of the presence of the slag which melts and acts as a flux, therefore when welding is to be done, wrought iron is the best material.

Soft steel is also much stronger than wrought iron, its tensile strength averaging about 10,000 lbs. per square inch higher. Machine steel can not be distinguished from wrought iron by the

almost any desired percentage of carbon, and as the hardening properties depend upon this percentage, a steel may be had which will harden to almost any extent.

Machine steel has been condemned for many uses, simply because a steel of too high carbon has been found too brittle, and therefore unsatisfactory. If a softer steel, containing a very low percentage of carbon, had been used, the result would probably have been entirely satisfactory. Steel can thus be made to meet almost any requirement; and for all *forging* purposes, except *welding*, seems to be by far the best material.

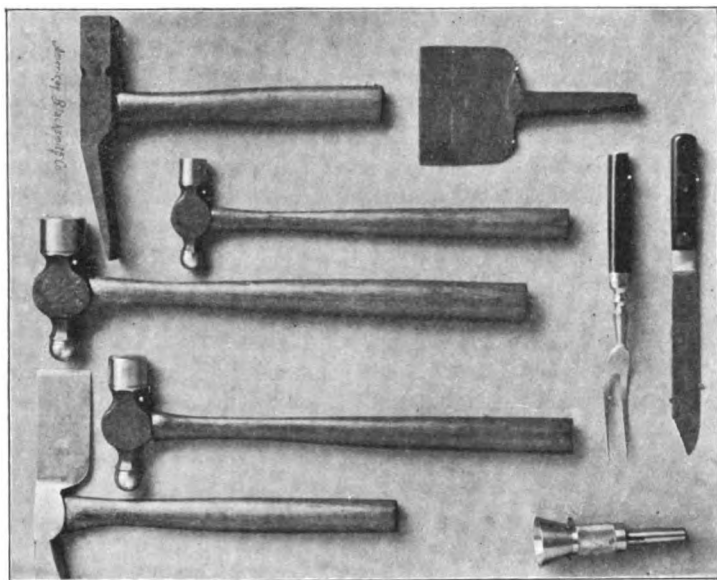
Tool steel may be made by the open hearth process, but the best tool steel is made by the "crucible" process. Ordinary tool steel contains about one per cent. carbon and may be made either by taking part of the carbon from cast iron, or by adding carbon to wrought iron. This latter is the common method. In the "crucible" process, small pieces of wrought iron and cast iron are mixed in a crucible in proper proportions to give the desired percentage of carbon, together with some charcoal. The mouth of the crucible is covered with a

in somewhat the same way. The process was based on the fact, that when wrought iron is heated in contact with some substance very rich in carbon, it will gradually absorb the carbon and become converted into high carbon steel. "Blister steel" was made by packing bars of wrought iron in some kind of charcoal, sealing them up air tight, and holding at a high temperature for several days. The outside of the bars would of course be carbonized first, making a shell or coating of tool steel around a soft wrought iron center. In other words we have added carbon to the low carbon wrought iron, and converted it into high carbon tool steel. If the heating were continued, the carbon would work in deeper and deeper, until at last the entire bar would be converted into steel. After bars were carbonized in this way by the old blister process, they were cut into lengths, welded, and again worked into bars, thus making the steel more uniform in composition, but not nearly so uniform as modern "crucible" steel.

Sometimes it is necessary to finish a piece of work so that the outside is hard and the inside soft; that is, the outside must be hard to resist wear, while the whole piece must be tough enough and soft enough to resist shocks and jars. If made of solid tool steel, and hardened enough to resist the wear it would be too brittle and liable to snap. To attain the combination of toughness and hardness the piece is made of wrought iron or machine steel, and the outside "case hardened."

To sum up: Wrought iron is made from cast iron by taking out some of the carbon—this being done at a heat below the melting point of the wrought iron. Machine steel is made from cast iron by taking out carbon, the process being the same as when making wrought iron, but the temperature of the furnace maintained high enough to keep the metal melted during the entire operation. Tool steel is made from wrought iron by adding carbon to it. Machine steel is superior to wrought iron for general forging purposes on account of its superior strength, uniformity of structure, and lesser liability to split. Wrought iron is weakened by slag seams, which are liable to cause splitting; it has, however, superior welding qualities.

A nice experiment, which shows the natures of wrought iron and machine steel, is to take a piece of each of these metals and put them in a bath of dilute acid for several hours or days. When



TOOLS MADE AT THE ILLINOIS STATE REFORMATORY.

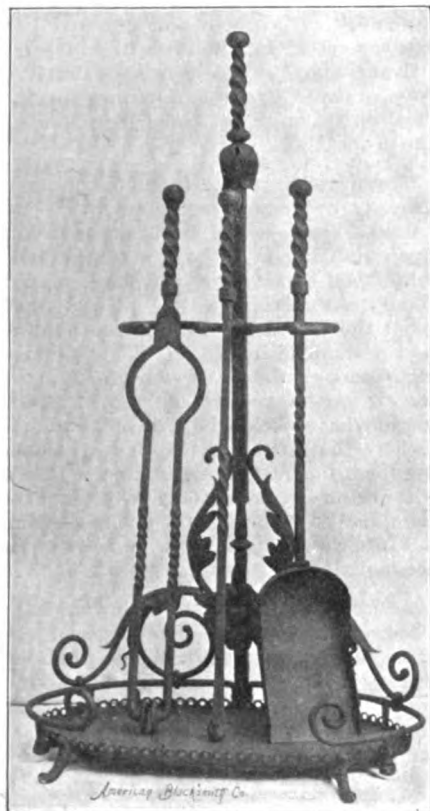
hardening test, for some irons will harden, while many soft steels can not be hardened at all. The Government specifications for boiler plate demand that the steel used in boilers shall be capable of being heated to a red heat, plunged into cold water, and when cold, bent double without showing any signs of cracking. This certainly indicates very little hardening.

Now, by the process outlined above, "open hearth" steel can be made with

lid to prevent the oxidation of the melted metal, the loaded crucible placed in a furnace and the iron melted down. When the iron has been melted and properly mixed, the crucible is taken from the furnace, and the steel cast into an ingot, which is afterwards rolled into bars.

What was known as "blister steel," was once made in almost the same way that "case hardening" is now done. "Harveyizing" armour plate is also done

taken out, the machine steel will be eaten away evenly, while the wrought iron will have small ridges standing



FIRE STAND MADE AT THE STATE REFORMATORY OF ILLINOIS.

out on its surface. These ridges are the slag streaks which the acid has left, having eaten away the iron between them.

The Blacksmith Boy in the Illinois State Reformatory.

J. GOOGERTY.

Instructor in Forging.

The Illinois State Reformatory, located at Pontiac, is the outgrowth of what was known as the Illinois Reform School for Juvenile Offenders. A law passed June 18, 1891, establishing the Illinois State Reformatory, has been the means of making this the largest of its kind west of the State of New York.

Prior to enactment of said law, only those convicted of minor offences were sent to the Reform School, but since all offenders between the ages of twelve and twenty-one have been received, the term of confinement being about two years. The aim of the reformatory is to provide for the thorough training of each inmate, in the common branches of English education, and in such trade or handicraft as will enable him, upon release, to earn a respectable living and redeem himself. As your journal is interested only in the craft of the blacksmith, I submit the following:

The ages of the boys in the blacksmith shop range from sixteen to twenty years. We aim to choose for this department, boys who are naturally adapted for this trade, but if we find out, after they have been in the shop for awhile, that they do not care to learn, or are better fitted for another line, we transfer them to another department. The mechanical talent thus developed in many of the boys is simply wonderful.

We work a boy about half a day—four and a half hours. The other half is spent in school, and his place in the shop is taken by another lad. Thus, we instruct about thirty boys during the day. When a new one comes in he is at once placed at a fire, and his work consists in welding pieces of scrap iron and drawing them out into bars from $\frac{3}{8}$ to $\frac{5}{8}$ inch by four feet. We keep him steadily at this, sometimes for months. At the end of that time he is thoroughly trained in the management of fires and is pretty handy with his hammer. The bars made are converted into heads for bolts, which are used in the institution. We offer nothing for sale that is made in the shop.

After this preliminary training, the boys are allowed to practice welding all kinds of iron and steel. They also receive instruction in carriage and wagon work, horseshoeing and structural iron-work, as the making of iron stairs, gratings, pieces for buildings, all kinds of tools, and even the ornamental iron doors, fences and grills for the institution. The accompanying cuts represent some of the work done by our boys. It is all handwork, including the tools, and excepting only the lathe-work on the hammers.

Hence at the end of his course, the boy is well fitted to choose whatever branch of the craft he may like best. He is a thoroughly competent blacksmith, and may earn a living in the world as a respectable citizen.

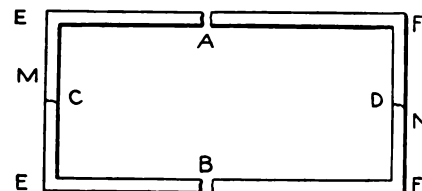
To Make a Chase for a Job-Press.

M. S. HEWITT.

I was given the job of making a chase for a job-press, and I nearly made a failure. I knew I was up against a hard problem, but I could not afford to fail.

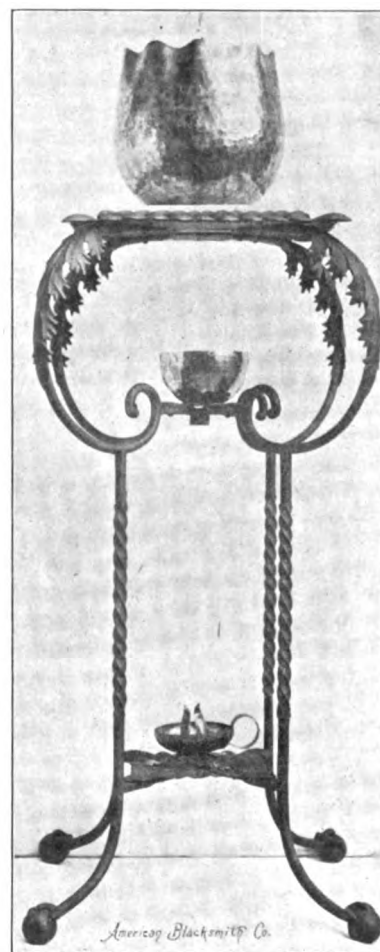
To make a chase is a nice job, for it is always a hard matter to make a rectangle, *i. e.*, a figure having four sides and four right angles. After trying to bend and weld, first one corner separately, then two corners, and still meeting with no success, I finally did succeed by the following method:

Bend or weld each corner separately. In the figure, M may be made in one piece, or the angles may be made



MAKING A CHASE FOR A JOB PRESS.

separately and welded at C and D. Of course the distance from E to E, and from F to F, must be the same, after



SOME ILLINOIS REFORMATORY BLACKSMITH WORK.

these angles are made to fit the try square. Weld in the center at A and B, and the work is finished.

The Blacksmith's Field.

A glance at the above cuts shows something of the wide range over which a blacksmith's work extends. Between the artistic pieces made by the Reformatory boys and the plain work-a-day chase with its four straight sides and four corners that appear so simple,—there is considerable difference. A smith never knows what he may be called upon to make or mend.

The Circle of Human Weal.*

EDNA MANNERS.

Thundering, soaring, the flames burst forth,
Shaking the floors of the new-formed earth.

The master of smiths at his furnace stood,
Wielding his might in a playful mood—
Lustly with youth,
Girded with truth;

Molten rocks touched by his breath, congeal,
Planning the circle of human weal.

Over the plains as the man-race swarmed,
His open heart loved them, his furnace warmed.

Wond'ring they gathered the stones cast forth,

Learning to delve in the depths of earth,
Iron and gold,
Riches untold.

Sagely he taught them with clang of steel,
Forging the circle of human weal.

* * * *

Fires are all out, and the furnace cold.
The weary smith-master is bowed and old.
All he could teach them the race have learned—

Wise as the gods to their home returned.

Purpose is wrought:

Wisdom all taught:

Silent the thunders and clang of steel
Welded the circle of human weal.

* Written expressly for the January AMERICAN BLACKSMITH.



Happy New Year!

One way to learn is by asking questions.

When a new idea comes to you, do you remember your fellow-craftsmen?

In a progressive shop a smith lacking up-to-date ideas is like a clock without a main spring—won't go.

I have had your paper for a year and cannot do without it. Enclosed please find \$1.00 for 1903. A. OSTLUND, FOSTER, IA.

Winter is here with its cold, crisp nights, and jangling sleigh-bells; and the horses must be sharp-shod.

A good workman cares for his tools. The most satisfactory way to do this is to get the best and keep them right up to date.

What do you think about the movement for securing a Lien Law for blacksmiths, horseshoers and wheelwrights in all the States of the Union? Let us have your views and suggestions upon the question.

A Situation as blacksmith is open at Glover, Michigan, where there is a vacant shop. Write to the postmaster for information.

I have been taking the paper and it is the best helper I have ever had in my shop. I would not be without it.

J. W. Bollnan, Pittsfield, Ill.

Are you a thinker as well as a worker? The former puts thought into even the smallest job, and is always on the lookout for better methods. Is that you?

Power is one of man's greatest boons. Have you considered the question of putting an engine into your shop? Smiths who have done so unanimously declare in its favor.

Tom Tardy's idea of economy is a common one; but an up-to-date man knows that the real meaning of the word is to have the right thing in the right place all round and thus save time, labor and money in the long run.

The storm king has Buffalo in his grip, and lashes his white missiles against the windows as we write. The city's shoeing shops are full of horses waiting to be sharpened, and to the busy farrier the snow-laden wind seems to howl, "O automobile, where art thou now?"

In spite of the wonderful advances that have been made in mechanical tools and appliances, no one need worry about their being no room for improvement. And the blacksmith shop is no exception to the rule. Great inventions are often stumbled upon by chance, but the inventors were wide awake all the time.

Fifty thousand strong—that's the size of the present January issue. And it practically means that all these people are brought together and enabled to exchange ideas through these columns on the endless number of interesting work-a-day topics relating to the craft. Have you a question to be answered? Send it in.

Our daily mail often exceeds 1,000 letters, and, if the number is under 500, the clerks feel that they are getting off easy. Comments from subscribers about the paper are carefully studied by the editors, ever alert to make the paper more valuable. Let us have an expression of opinion from you when sending your renewal subscription.

It has been said, humorously, that when a man couldn't do anything else he invented a new breakfast food or a rubber horseshoe pad. Leaving the benefits of the many new breakfast cereals out of the discussion, the very fact of the number of such rubber shoes on the market shows the demand for them, and the demand in turn is evidence of the benefits arising from their use.

The Pennsylvania Railroad at Renovo, Pa., is pushing the work of the erection of their new buildings. The southern end of the machine and blacksmith shops have been razed to the ground and the new steel framework is rapidly being placed in position. The brickwork of the new blacksmith shop and addition to the passenger car shop has been completed, and the work of roofing the buildings will soon be started.

Raphael Beck, when he painted "The Village Smithy" for our subscribers, was by no means the first artist to picture the blacksmith in glowing colors. Poets, too, have painted him in words, as representing all that is noble and honest. Our greatest poet, Longfellow, in his poem "Evangeline," says: "Since the birth of time, among all races and nations, has the craft of the smith been held in repute by the people."

There was a great stir and bustle about Tom Tardy's shop yesterday when we passed. It looked like business. But upon glancing at the faces of the men who stood or sat about the place, we felt there was something wrong. When asked what the trouble was, Tom said, Oh, he had some repairing to do. This sounded right enough until we came to find out that it was a pair of old tongs—which might have belonged to his grandfather—that Tom was working at, mending them for the twentieth time, at least. The customers, no matter how pressed for time, had to wait until the old tools were put into shape. Tom says he believes in economizing.

A subscriber, Eph. Shaw, Carbon Hill, Ohio, writes:—"Please find enclosed post office money order for the sum of one dollar for the renewal of my subscription for another year. I think your journal is worth twice the subscription price. You are giving us a good journal on our trade. I don't see how some smiths can run a shop without a paper devoted to their trade, yet we find them all over the country, and when you ask them to subscribe for such a paper they will say they don't need it. They are grumbling because they have no trade, but upon looking around their shop you will see tools that Tubal Cain worked with. They bind a tire on the wheel, they punch a hole in all material that is punchable, just like Tubal Cain, and if a job came in that had to be drilled, they could not do it nor would they know where they could get a good drill to do such work. I think the lessons which you are giving us on forging are very good."

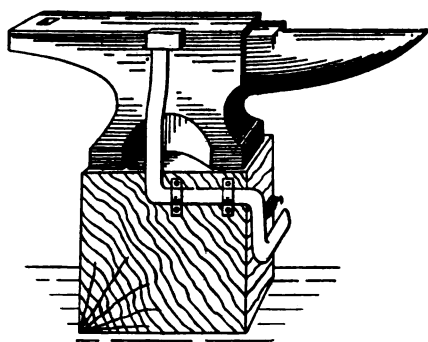
Out in the west, where the conditions of living are very near to nature, a man owned an indian pony or cayuse; these ponies are sturdy little natives of the country and climb the mountains over trails that our horses would not face. After riding the cayuse for two or three years in the wilds, without shoes, the man took him to town, thinking him well "broken in." The horse was shod and put into use, but he could not understand the ways of civilization. With the second canter on the asphalt, the pony slipped fatally, and the man's shoulder, as well as the pony's two fore-legs, were broken. It takes two or three generations to civilize these ponies.

In the same portion of the hill country, the only blacksmith shop within miles is a rough forge built in the living rock and sheltered by a roof of cedar "shakes." In a rude cabin near by are kept a few tools. All is open, and the passerby is free to step in, but he must do his own repairing, for every man is his own smith.

A Serviceable Horseshoe Holder.

A. H. WICKLER.

The accompanying illustration shows a very useful device for clamping horseshoes to the anvil during the process of drawing out calks. Every shoer knows that it is quite a difficult job to draw calks on shoes, especially after they have become badly worn. They will



AN ANVIL HORSESHOE VISE.

slip in spite of everything. The means which I employ for this purpose is exceedingly simple, and I would not do without my holder for a great deal.

In making the holder, I first took a rod of 1-inch round iron, heated the end and then upset to make it $\frac{7}{8}$ by $1\frac{1}{2}$ inches square, for four inches along the end. This I bent at right angles so as to fit along the top of the anvil, and when finished this piece should be about $\frac{3}{8}$ of an inch above the top of the latter. I next fastened the rod to run down the anvil, curving it out a little towards the base of the anvil. Then I bent the rod at right angles so that this part would run horizontally along the anvil block,

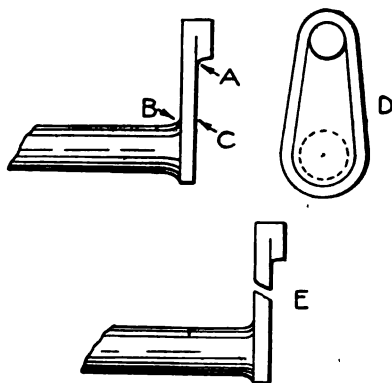


FIG. 15. ROCKER ARMS, FRACTURES AND REPAIRS.

then down again, with a right angle foot piece extending off parallel to the ground. A reference to the illustration will serve to better explain the construction of the device. The foot lever should be about twelve inches round and flattened out to give it better bearing for the foot. The horizontal crosspiece I fastened to a stout wooden clamp by means of curved pieces which

are bolted to the block. I prefer to place a strip of iron underneath the rod to prevent its bearing upon the wood itself. The length of the various parts should be made, of course, to fit the anvil to which it is intended to attach the device, and the upper part can be bent so as to hold a shoe exactly as you want it.

In order to hold the holder back from the anvil, when not in use, I attach a spring to the lower arm and to the anvil block, and this may be of sufficient tightness to hold the upper part as far from the anvil as desired. I prefer to let it clear about five inches when not in use. I like this arrangement, on the whole, much better than any foot vise, because it is always where you want it and never in the way. In the summer time, I take it off the block entirely.

It takes very few trials for this arrangement to prove its merit to any smith trying it. The cost, too, is exceedingly small, the only requirements being a bit of iron and the little time employed in measuring, fitting to the anvil, and forging. The result is a holder second to none.

The Railroad Blacksmith Shop.—3.

W. B. REID.

Repair of Rockers.

In larger shops, where duplicate parts of locomotive forgings are kept in stock, many defective rockers are consigned to the scrap bin which the smaller shop finds it expedient to repair. The resulting economy of time and labor, especially in the machine department, justifies the practice. To repair a rocker neatly and substantially, it requires superior skill and workmanship than making the new article. The larger proportion of fractures occur invariably at one of three points. First, at base of hub, or boss of arm (Fig. 15, A); second at base of arm at point of conjunction with shaft (Fig. 15, B); third, at point where arm was originally welded to shaft (Fig. 15, C). The repair of fractures at A and B will be dealt with here. The break at C will be treated in the next chapter.

In the first two instances, the fracture is often partly the result of machining to sharp corners instead of safe fillets. In urgent cases, where the parts still adhere, the repair is often very simply done by shrinking a band of suitable proportions around entire arm (Fig. 15, D). Though neither artistic nor mechanical, rocker arms bound in this manner often endure many years of hard service.

The repair of fracture at point, Fig. 15, A, involves the substitution of a new end (Fig. 15, E), which should be carefully forged to secure a uniform texture of iron. Fracture is generally the result of carelessness in this respect, aggravated by sharp corners.

When not thoroughly welded in forging, the triangular fuller, used in forming boss of arm, cuts through the iron across the lines of direction, producing the weakening effect suggested by the

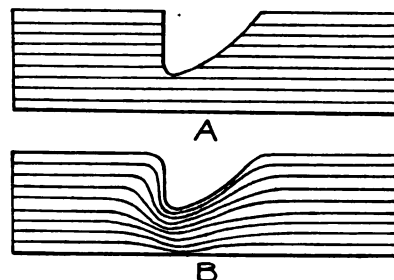


FIG. 16. EFFECT OF WELDING ON FIBER STRENGTH.

broken lines in Fig 16, A. Contrast with the strength and elasticity indicated in Fig. 16, B. This result can be secured only by forging and finishing the piece throughout with welding heats, securing thereby a piece of iron of a comparatively perfect, homogeneous quality.

The new part should be forged with sufficient stock for finish and reduction in working. The old part should also be well upset for the same reason, as far down towards shaft as possible. This will allow more freedom in heating, and permit the perfect restoration of lines of arm at machine (Fig. 17, A), as contrasted with the unmechanical result (Fig. 17, B), where sufficient stock to true up the arm has not been secured. The parts may be scarfed in different ways. (See Figs. 18, A, B, C, and D). Fig. 18, A, is preferable to Fig. 18, B, as it carries the points of inside scarves safely away from shaft, ensuring a better weld. The seeming advantage of the lap scarf, Fig. 18, C, is largely neutralized by the awkward-

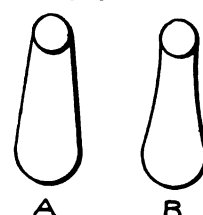


FIG. 17. COMPARISON OF ARMS WITH SUFFICIENT AND INSUFFICIENT STOCK.

ness of the parts in handling. During many years of practical experience the writer finds the method shown in Fig. 18, D, by far the safest and most reliable. Welded with good, clean, separate heats, followed by two slow side heats, the job can be handled and finished with the utmost freedom. On the

contrary, no matter how carefully handled, the parts welded, as in A and B, Fig. 18, will always have a tendency to draw apart in working, at inside point of scarfs.

The fracture at Fig. 15, B, involves repair of a more extensive and difficult nature, and may be done in two ways. First method: Cut arm entirely off at

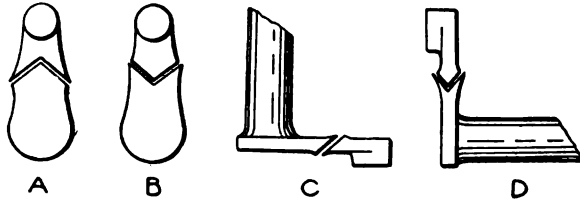


Fig. 18. METHODS OF REPAIRING THE ARMS.

extremity of shaft. Upset shaft well and scarf as in Fig. 19, but reverse the way so that in taking side heats the laps of scarf may lie downward in the fire. As in the previous case, the new part should be thoroughly welded in forging to insure best results. The process of forging is here shown. Fig. 20, A, is a piece of iron large enough for the purpose, checked down on opposite sides with triangular fuller; adjusted to shape B; C is part for shaft dressed, rounded and scarfed to weld, as in Fig. 19. The parts should be welded under steam hammer if possible, and finished with two good, slow side heats. This

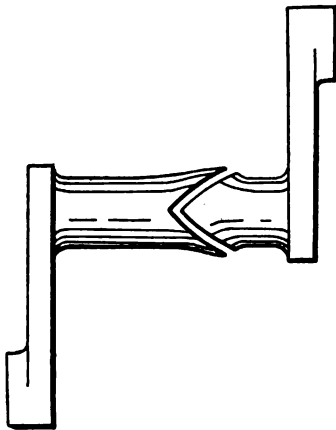


Fig. 19. WELDING A FRACTURED ROCKER SHAFT.

new piece could also be forged as at D, and bent around, but being so short the bending would prove rather a stiff process. Second method: Forge a new piece of shaft with a square collar on the end (the arm is forged separately and welded on collar). This method requires two welds, but it greatly simplifies the forging and makes it possible to secure a better weld in the shaft.

The objection urged, in former articles, to welding rockers in shaft, may be raised at this point. In the

former case, however, the manufacture of new rockers was involved; in this, expediency and necessity justify the practice. With extra precautions, possible in the repair of an occasional rocker, the method may be considered reasonably safe and reliable.

(To be continued.)

A Good Punching Guide.

A. T. DICKINSON.

The sketch which accompanies this article shows a very useful implement for use in any smith shop. I have never seen anything exactly like it.

To make this punch guide, I take a bar of steel about five inches long, $\frac{5}{8}$ or $\frac{3}{4}$ of an inch thick, and one inch wide. Two or three holes of the desired size are then punched, as shown, after which a piece of $\frac{1}{2}$ -inch steel is punched with the same number of holes in the same position, but somewhat larger, so as to hold the punch. The second piece is then fastened to the first by two rivets and the tool is completed. A, represents spring, B, the punch. The use to which I apply this tool is punching holes in $\frac{3}{8}$ -inch boiler steel. If the end of the punch is carefully tempered, you can punch thousands of holes. You can have several different sizes of holes and punches. If the points of the punches are kept in order, punching will not damage or split the plate. This device will save considerable time in drilling holes.

Diseases of the Foot and Their Treatment.—12.

Notes upon the prevention of interfering, the treatment of wounds and the complications resulting therefrom.

E. MATHEW MICHENER, V. M. D.

The prevention of interfering is a subject of the greatest importance to the shoer, and the general outlines of treatment of it and its complications may also be studied with advantage by both the shoer and the owner of the horse. The cause of interfering is not the same in each case, and not unfrequently two or more causes contribute to the formation of the trouble. The prevention consists in carefully studying the cause, or causes, operative in the individual case, and the application of the knowledge gained thereby.

The points to observe are: Conformation of the animal, including the form and condition of the hoof; the shoe, and the method of shoeing; the amount and character of the work done by the

animal, as well as the nature of the road or surface over which it must travel in doing its work. The term interfering is applied to injuries of both front and hind legs when caused by contact with the foot of the opposite side. It occurs at any point on the inner side of the hind leg between the fetlock joint and the coronet. In the front legs it may occur at any point between the knee and the coronet. In both front and hind limbs the most frequent point of trouble is at the prominence of the fetlock.

The most common fault of conformation which acts as a cause is that condition in which the legs are placed too closely together. Another conformation which is a frequent cause, is that in which the toes point decidedly in an

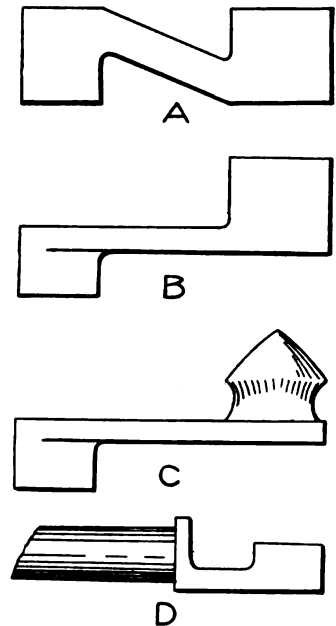
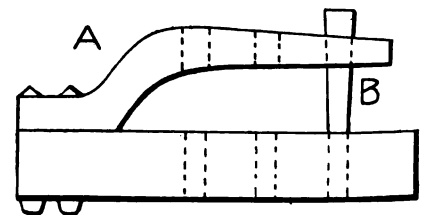


Fig. 20. METHODS OF FORGING ROCKER ARMS.

outward direction. It is a fact that some animals of decidedly bad conformation do not interfere, while those of good conformation may, under certain other causes, interfere badly. Youth and insufficient training may be a cause in animals of good conformation. Not uncommonly, animals of fair form inter-



A HANDY GUIDE FOR PUNCHING.

fere only when overworked or while suffering from some constitutional disease.

A very common cause of interfering is that condition in which the foot has

been subjected to faulty paring. The fault of paring the inner quarter too low is by no means rare, and strange as it may seem, the excessive paring of the inner half of the wall is resorted to by many shoers as a preventive treatment for interfering. When asked the reason for this, most shoers reply that by removing the inner wall the hoof is made smaller thereby, and can then pass its opposite leg without striking. It is a fact that lowering the inside wall throws the fetlock joint inward, and thus tends to defeat the purpose for which the paring is done. It is while the weight of the animal is upon the leg that the interfering is done, and it is also at this precise time that the prominence of the fetlock is thrown abnormally inward.

Neglected feet with sharp edges of horn may cause the unshod animal to interfere, and badly finished shoes or imperfectly clinched nails are a well known cause which requires no further mention.

While it is not possible to formulate any rule that will apply to the shoeing of all cases of horses which interfere, one general one that will apply to the majority of cases is: So dress the foot that the inner side will strike the ground slightly before that of the outer side. Lowering the outer wall accomplishes the purpose of relatively lengthening the inner wall. In no case should the paring be carried to the extent of weakening the quarter, or causing pain or tenderness. In cases in which the inner wall has been lowered excessively, much may sometimes be done by raising the inner side of the hoof by means of a thickness of leather placed between the shoe and the wall. In some cases, where the interfering has existed for considerable time, there is more or less enlargement at the point of striking, caused by thickening of the skin and deeper tissues at the injured point. This renders shoeing very difficult. If the injury is acute, the shoeing should be deferred until time has been given for the swelling to subside. Whenever it is possible, the use of predisposed animals upon rough roads should be avoided.

The symptoms of interfering vary according to the extent of the trouble. In very mild cases the hair may show a slight ruffling only at the point touched; other cases present wounds of variable extent, from that of the slightest scratch or abrasion to those in which the skin appears as though rubbed with a rasp. If blood be drawn by the

injury, the striking point is commonly marked upon the opposite foot. Lameness in uncomplicated cases may only be noticed at the time of striking, and lasts only a few steps.

Complications of interfering wounds are several, and may be a simple inflammation of the surface of the skin, or it may extend to the deeper subcutaneous connective tissue, and in extreme cases to the tendons, their sheaths, or even to the fetlock joint proper.

A complication of rather frequent occurrence is that known as lymphangitis or farcy. This condition is caused by the entrance of germs into the lymphatic circulation, and is characterized by sudden inflammation of the lymphatic veins or ducts. It causes great swelling accompanied by great pain, commonly on the inner surface of the leg, and it may extend from the point of injury to the thigh, or even to the lower surface of the abdomen. The veins near the surface of the part are seen to stand out tense and full; the skin is hot and very painful to pressure, and the animal evinces great disinclination to walk, although it can generally do so if urged, and becomes noticeably better in movement the more it is made to move. A slight cut or abrasion in the lower region of the legs seems more liable to be followed by lymphangitis than does a deeper cut which has bled freely. Deeper cuts are liable to be followed by this complication only if they have been neglected for a time. Other injuries than those caused by interfering may also be followed by lymphangitis.

The general body temperature is commonly considerably elevated, and may reach 106 degrees Fahr. or higher. The appetite is frequently impaired during the first day of the attack. The treatment of lymphangitis is local, and in cases where the temperature and general system is visibly disturbed, internal medicines are indicated. To treat the case locally, first clip the hair closely over and around the point of injury, cleanse the wound with warm water and soap, and apply some good disinfectant. For general use creolin, one tablespoonful to the pint of water, makes a good application. The whole extent of surface showing pain and swelling should have warm water sponging for periods of fifteen minutes, or longer, three times daily, and the surface must be dried well after each bathing with dry, soft cloths. Exercise is of the greatest benefit, and should be

given if it is at all possible to make the animal move. The case should have a clean stall and be protected from currents of air. The food should be light and laxative. During the more acute period of the disease internal medicines may be required, but their use should be directed by a qualified person, according to the requirements of the case.

In rare cases of interfering, localized gangrene or death of a part of the skin and even the deeper parts may result. The first visible symptom of gangrene shows upon white legs as a reddened spot, which becomes more and more dark colored and sinks somewhat below the level of the surrounding skin. The gangrenous skin is devoid of sensation, but pressure may produce pain in the parts beneath. The complication of gangrene requires careful attention as the disease may extend to greater area and depth and become serious. The general treatment consists in disinfection and warm applications, which act as a poultice and hasten the separation of the dead skin. A warm water bath containing creolin serves the double purpose of disinfectant and poultice. The foot and fetlock should be scrubbed clean before immersing in the bath. As soon as the dead parts begin to separate from the living portion, the scissors should be used to cut away all loose portions of skin, and as soon as red living parts are detected they should be covered with a powder, consisting of powdered burnt alum, eight parts, and powdered iodoform, one part. This should be applied with pressure sufficient to make it adhere to the living parts of the wound, and frequently enough to keep the surface covered.

Another frequent complication of interfering wounds is that known as grease or greasy heel. This is a diseased condition of the deeper layer of the skin, and is characterized by pain on pressure, some swelling, and red coloration visible on white legs only, and more or less lameness may be present. Later a sticky, yellowish fluid is seen to exude from the surface of the skin. This discharge glues the hair of the region together, and is characterized by a peculiar, disagreeable odor. The skin may crack and form deep fissures, which run from side to side and bleed upon exercising the animal. In severe and neglected cases, the skin of the region may be the seat of mushroom-like growths, having the appearance of what is commonly called proud flesh. The treatment of grease should be careful and constant. Cleanliness of the

part is of the highest importance, but the use of water for cleansing purposes is generally objectionable, as the average case recovers most rapidly if kept cleansed with clean, dry cotton or linen cloths. Exercise is beneficial in treatment of grease, excepting possibly certain cases where fissures or cracks are severe. If the parts become soiled with mud during work or exercise, allow the mud to become dry, and remove with clean brush and dry cloth. As an application for local use, the following solution will be found satisfactory if above directions as to care are followed, and no ointment of any kind applied to the part. Take of chloride of zinc, one dram, and clean water, one pint; mix in clean glass bottle or jar, and apply twice daily with a clean sponge.

Of course in this, as in every other malady, prevention is better than cure. Prompt attention and a little extra care of the animal in the early stages of the trouble, will prove of greater benefit than will all the doctoring in the world after lameness has become established.

There is no other subject which the shoer has to deal with that requires more careful thought and good judgment than does interfering. The foregoing is intended to serve as a general guide in the treatment of interfering and its consequences, but the topic is so broad in its nature and its phases so numerous that the farrier will need to study causes carefully and exercise his best judgment.

(To be continued.)

The First Subscriber to The American Blacksmith.

Several months before the date of issue of the initial number of THE AMERICAN BLACKSMITH, October, 1901, announcements and prospectuses of the paper were sent all over the country. The first paid subscription reached this office June 27, 1901, and was from Mr. William McEachran of Anaconda, Mont. We take pleasure in giving herewith a portrait and brief sketch of Mr. McEachran's life.

Born November 9, 1854, on a farm near Chatham, Ontario, he began his apprenticeship April 7, 1871, at Charing Cross, Ontario, in a general blacksmith shop, where they manufactured all kinds of wagons, buggies, sleighs, cutters, plows, harrows, cultivators, and did all kinds of horseshoeing. Leaving home in 1875, he worked in different towns of Michigan as a general blacksmith, ironing wagons, buggies, sleighs,

cutters, as well as making all kinds of lumberman's supplies, known in those days as skidding-tongs, swamp-hooks, cant-hooks, pevies, chain-hooks, and other articles too numerous to mention. Last, but not least, he did some horse-shoeing, and in some cases shod oxen that worked in the lumber camps.

In 1881, he started business for himself in Cheboygan, Mich. In 1884 he moved to South Dakota. Here his work was repairing farm machinery and implements. After five years of uncertain crops and prices, he went to Spokane Falls, Wash., and there ran a



MR. WILLIAM MCEACHRAN.

prosperous shoeing shop until the panic of 1893. Not satisfied with the prices for shoeing, he retraced his steps to Anaconda, Mont., where he has continued his horseshoeing up to the present time.

For the last twelve years he has made a specialty of horseshoeing in all its branches, shoeing the heavy draft horse, the gentleman's roadster, the light-harness or race horse, and the runner. Amongst the light-harness horses, he has shod horses of note, that have raced on the Northwestern race tracks, such as Anaconda, Searchlight, Lena N., Edith W., Raymond M., Kentucky Union, Klamath, Caryle Carne, Surphol and Altoka.

Mr. McEachran says that he is still an apprentice, learning something new every day. He is a close student of his profession, has a good library on the science of horseshoeing, subscribes for all the leading journals, and, at convenient times, contributes articles on horseshoeing to periodicals. Mr. McEachran is a loyal member of the

National Master Horseshoers' Protective Association, takes a lively interest in all its affairs, and is a staunch supporter of its principles.

Announcement of the American Association of Blacksmiths and Horseshoers.

The Association named above has been conceived and created with the object of benefiting the blacksmithing, horseshoeing and wheelwrighting craft in several important ways. Its first and most important aim is to endeavor to secure for the craft the protection which is afforded by lien laws in various States, together with other favorable legislation. It intends likewise to furnish wholesome plans of organization and competent organizers to place such movements in various States on a firm working basis. Its aim is to leave no stone unturned to better the material and business welfare of the craft, individually and at large. As its ally, the Association has one of the best and most progressive trade journals in America.

No false or misleading statements will be sent out by its management, and good suggestions and advice will always be welcomed. Men of standing and character can secure valuable positions as organizers in various States. A campaign of education will be carried on. Sound statistics will be presented for candid consideration.

Many blacksmiths and horseshoers have never given a thought to some items of expense in their business, which are as much a part of it as the stock used. Take for example, the cost of shoeing a horse. Will any fair-minded mechanic say the following estimate is overdrawn? And yet, some men act as though the mere cost of the shoes was the sum total of the expense.

Net average cost of four shoes,	\$0.28
Nails used, spoiled and lost,	.03
Coal and toe steel,	.03
Interest on capital invested,	.03
Depreciation of equipment,	.03
New tools bought yearly,	.03
Losses, loans, theft and neglect	.03
Losses, rust, wear and tear,	.03
Rent,	.06
Bad debts,	.10
Total,	\$0.65

Suppose a farrier shoes two, three or four horses a day, how much does he make by the week, month or year? Figure it up carefully; there is food for thought in it. Everyone will say that the mechanic who shoes a thousand horses in a year, does a year of good

hard work, takes many risks, and gives much valuable advice. In order for him to receive as much as the regular wages of good journeymen in the large cities, he cannot charge less than \$1.50 per set. And if he charges \$1.00 per set, he will not make \$7.00 per week. Is it any wonder that many of the craft are living from "hand to mouth," and are dissatisfied with the business? It would seem needless to say that \$1.00 per set is too low a price for shoeing. In these days of increasing living expenses and high prices for stock, it behooves the craftsman to turn his attention to a solution of the problem of how he may best obtain a proper profit from his labor. Towards such a reform the energies of this Association will be directed.

The American Association of Blacksmiths and Horseshoers asks that the readers of this article interest themselves in the movements under foot for bettering craft conditions, and would likewise be glad to have expressions of opinion from those who have given thought to this subject. The Association would also be glad to receive the support of the craft as a body, and urges that the readers of this article refer to page 23 and express their approval of the movement in the manner indicated on that page. What is your opinion regarding a lien law in your State to insure prompt payment for all work you do, and what also is your opinion regarding the benefits to be obtained from a local Association in your own county?

The Scientific Principles of Horseshoeing.—15.

B. W. PERRIN.

Shoeing for Laminitis.

Laminitis, commonly called founder, flat sole, pumiced foot, etc., is inflammation of the sensitive laminæ. Laminitis may be acute or chronic. In the acute form it may result from a chill, or as an after-effect of a severe drive on hard roads following a period of idleness. This causes the laminæ to become congested. It may, and does often, result as an after effect of inflammation of some other organ of the body, such, for instance, as enteritis, gastritis, or pneumonia. Laminitis following an attack of pneumonia—inflammation of the lungs—has given rise to the term chest-founder, by the process of metastasis—a shifting of the seat of inflammation—from the membrane of the lung or bowel to the membrane of the foot, causing inflammation of the foot.

A draught of cold water when a horse is overheated, or over feeding, are among the causes of laminitis.

The symptoms of acute laminitis are so characteristic as to be unmistakable. The fore feet only are affected, and



Fig. 77. SECTION OF LAMINITIC FOOT, SHOWING DISPLACEMENT OF THE OS PEDIS AND SUPERABUNDANCE OF HORN AT THE TOE.

invariably. The animal stands with both forelegs advanced, the heels of the feet resting on the ground, often with the toes slightly elevated. The hind legs are forward well under the center of gravity of the body, the horse leaning back on the haunches so as to get the weight as much as possible off the fore extremity. The face is expressive of great suffering, the body often bathed in profuse perspiration. There is high fever. The animal is so loath to put weight on the affected feet, that a whip will not force him to budge.

The treatment of acute laminitis belongs to the veterinary profession. I should advise the horse-owner to call in the veterinary surgeon with least possible delay; for it is the application of early treatment which does so much to modify the deformity of the foot which always follows an attack of laminitis. The services of the shoer are not required during the acute stages of the disease, unless, perhaps, to pull off the old shoes; but since an attack of laminitis always deforms the feet (see Figs. 77 and 78), according to the severity of the case, it is in the after treatment that the skill of the shoer is so indispensable.

During the acute stages of the disease, the congested laminæ exude a fluid which separates the sensitive from the insensitive laminæ. The pressure of this fluid forces the os pedis downward. In a few serious cases, the toe of the os pedis is forced through the sole of the hoof. The more the os pedis is depressed the flatter the sole will be; in some bad cases the foot bone is sunk

so low that the sole is even convex instead of concave.

Laminitis leaves its indelible mark on the afflicted hoof. The symptoms are so characteristic that the student of digitalotomy can tell a laminitic horse when trotted toward him, even though he be a block away. The toe and front part of the sole being the seat of pain, the horse, in endeavoring to relieve the affected part of concussion, places the heels to the ground first, thus wearing away the heels of the shoe first, and when such feet are shod with an open shoe and heel calks, the continued concussion on the heel of the foot diminishes the secretion of horn at that part. As a result, the heels of laminitic feet are, without exception, very low, while the frog is abnormally high (Fig. 79). Hence when the shoe is off, the frog only touches the ground, and horse-shoers who are not students of pathology of the foot—observing that the horse could scarcely stand without the shoe—concluded that the frog could not stand any pressure. It is therefore common to-day to see hundreds of laminitic feet shod with very high-heeled calks, in order—as such shoers will tell you—to prevent the frog's touching the ground. But this is a grave error, for the high heels not only add to the discomfort of the animal, but they seriously retard the growth of the hoof at the heels. Once a horse has had a bad attack of laminitis, the wall grows downward very slowly, hence

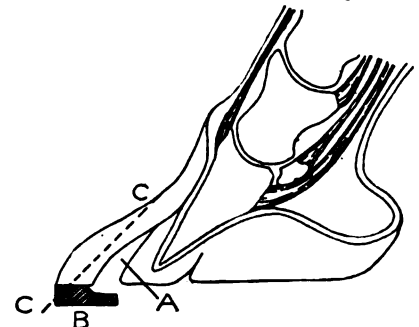


Fig. 78. A, SEPARATION BETWEEN WALL AND INNER LAYER OF HORN. B, SECTION OF SEATED SHOE. C C, HOOFTO BE RASPED OFF.

there is but little wall to cut away on the plantar surface. But instead of growing downward as in a healthy foot, it grows out long and shallow at the toe (see Figs. 77 and 78), with irregular rings running around the outer wall. You may rasp off these rings, also the surplus growth of toe, but the same condition will recur with the growth of new hoof.

In some bad cases where the abnormal growth of toe is considerable and the horse is shod with a seated shoe, the

whole weight of the animal being thus imposed on this outer rim of wall, separates the outer from the inner layer of horn, causing a cavity in the wall (see Fig. 78). This cavity becomes a receptacle for dirt, stones, etc. These

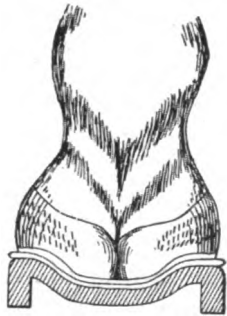


Fig. 79. SHOE APPLIED TO LAMINITIC FOOT WITH ABNORMALLY DEVELOPED FROG.

cavities have a tendency to extend up to the coronet causing other complications. Further description and treatment of such cavities will be fully dealt with in an article on "seedy toe." Some horses develop a chronic form of laminitis, which slowly changes the form of the foot without an acute attack. I have known several horses to develop a laminitic foot of a modified form without having been laid up a day. In bad cases, the horny sole being so thin and so near the ground exposes the sensitive sole to injuries from bruises, sometimes causing the sole to fester, in which case the pus must be given exit through an opening in the horny sole at the seat of injury. Do not thin the sole, however, unless you feel sure there is imprisoned pus.

Laminitis affects all sorts and conditions of horses and occasionally a mule; but horses of a heavy lymphatic habit of body are much more prone to the disease. It is common for some laminitic feet to be very tender at the heels, especially where high calks have been used for a long time. I have seen some where the heels of the hoof were so low that they were on the point of bleeding. If the feet are very sore I should advise poulticing for a few days before shoeing.

Preparation of the Hoof.

In preparing the laminitic hoof, rasp off some of the surplus growth of toe (see Fig. 78). The amount that may be taken off with safety and advantage will depend on the conditions of each case. In some feet, where the attack has not been very severe, you may rasp off all the abnormal growth of toe, making the profile of the hoof describe a straight line from coronet to plantar surface, as indicated by dotted lines CC, Fig. 80, but this is not admissible

in feet more seriously affected, so the shoer must use discretion. The sole being flat and thin, needs its full thickness, therefore it should not be pared. Any surplus growth of wall at the plantar surface should be reduced, and the toe rolled up to the extent that the old shoes are worn.

As to the kind of shoe, all laminitic feet should be shod with bar shoes or rubber pads. For bad cases the shoes should be very wide in the web so as to afford protection to the sole. If there be an abnormally developed frog with low heels, the rubber pad is not admissible until the frog sinks back to its normal position. Use a bar shoe, with the frog piece large (see Fig. 81), so that it does not cut into the frog as a narrow bar will do. Bear in mind also, that the frog, having been deprived of its natural function—weight-bearing—for so long, normal conditions cannot be restored at once; for if you put too much weight on the frog to start with, you will be disappointed with a lame horse. The change from abnormal to natural conditions must be brought about gradually. Hence arch up the bar of your shoe corresponding to the height of the frog above the heels, weld a steel slug on each heel, then fit the shoe so that the bar rests lightly on the frog (Fig. 79). If the heels of the feet are sore, leave the bearing off the heels, and nail the shoe round the toe, using a leather, tar and oakum. When the shoe put on, as here described, has been on a month, you will find that the frog has sunk a little. Now you can put a little more weight on the frog; and after a few shoeings you will notice that the heels of the hoof—being relieved of the severe weight—are beginning to grow up. You can then put equal weight on heels and frog. It may take six months, or even a year,

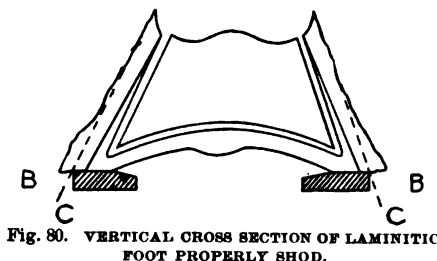


Fig. 80. VERTICAL CROSS SECTION OF LAMINITIC FOOT PROPERLY SHOD.

for the frog to sink back to its normal position, but it certainly will do so if my instructions are carefully followed. When the heels are level with the frog, there is no system of shoeing equal to rubber pads.

Regarding sole pressure in laminitic feet, of course I have come across many

feet with soles so thin and sore that it was necessary to concave—seat out the shoe—right to the nail holes in the first few shoeings, but the idea that the sole of a laminitic foot will bear no weight is erroneous. The sole of such feet will carry some weight, and be greatly benefited by it, provided, of course, that the change is made gradually, and that you do not thin the sole by paring.

In many cases the outer wall is so weak and brittle from the constant use of seated shoes, that the horn will not hold a nail, simply because this thin outer shell is thus made to carry the whole weight of the animal (see Fig. 78). But if you gradually widen the bearing of the shoe until you divide the weight between the wall and outer margin of the sole (see Fig. 80), the wall, being thus relieved of some of this abnormal weight, will soon grow down stronger. The weak, brittle condition

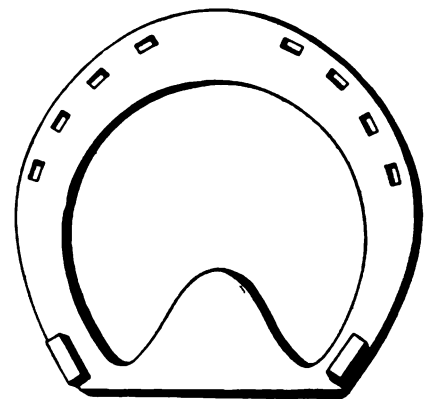


Fig. 81. THE PROPER SHOE FOR LAMINITIC FEET.

of the wall renders it liable to fracture; hence it is quite common to see a laminitic foot with quarter or toe crack. A strong stimulant applied to the coronet with friction will do much to improve the quality of the wall. In a few very serious cases that have not received the advantages of treatment by a competent veterinarian, the deformity may be so severe as to render the animal fit only for plowing.

In conclusion I would say, that while the deformity of the feet resulting from laminitis is incurable, it may be considerably modified by skilful shoeing, adding greatly to the animal's usefulness.

(To be concluded.)

A Hand-Made Furnace Front.

The accompanying engraving was taken from a photograph sent us by Todd & Peters, San Francisco, Cal. It shows a furnace front in antique style, made for an ordinary cast iron heating furnace. It is six feet four inches by five feet one inch, and is made of

quarter inch steel, the entire work being made by hand, no tools being used but the punch, drill and hammer. The design is original with the above firm, the only instructions which were given them being as to size and intended purpose. After completion, the piece was placed in the music room of the country residence of Mrs. Phoebe Hearst at Pleasanton. This front was designed to be in keeping with the rest of the room, which is furnished throughout in antique style.

The Advantages of Gas Engines for the Smith Shop.

The prize competition, conducted by THE AMERICAN BLACKSMITH upon the above topic, resulted in a host of articles from smiths who have installed engines, and it is a significant fact that not one of the writers had a word of regret for having put in an engine,—in fact, the verdict was unanimously in favor of power in the shop.

Briefly enumerated, the chief advantages brought out for the blacksmith's gas engine were as follows: A saving of time and labor; more and better work; the greater revenue; the low cost of running; superiority over other forms of power; constant readiness for service; suitable capacity or size for the smith's requirements; the excellent advertisement, and consequent attraction of new trade; and finally, the opportunity for profitable side lines, as grinding feed, shelling corn, cutting ensilage, disc grinding, plow sharpening, wood sawing, churning, and many other things.

After careful consideration of the question under discussion, and the many contributed articles, the prize of five dollars has been awarded to Mr. J. K. Riblet, of Florence, Ohio. A year's free subscription to THE AMERICAN BLACKSMITH is also given to Mr. E. H. Brewer, of Seaton, Ill., and Mr. John S. Schafer, of North Creek, Ohio. These three prize-winning articles are printed below.

Of the large number of very meritorious articles, we regret that lack of space prevents publishing here all except a very few. Almost without exception, all the articles submitted were of a very high standard.

Prize Article No. 1.

J. K. RIBLET.

I was working alone, doing all kinds of jobs, wood and iron, except shoeing. But I found that I was wasting some good timber, together with an immense amount of time and muscle, getting stuff into shape. A job would come in, such as a plow beam, bolster, axles, reaches, eveners,

heavy and light, and it would be impossible to have a stick just the right size and shape for every such thing. There was no mill where I could get ripping done, so I had to pick out something and go to work with handsaw, axe, adze or draw shave, doing more work to get a stick in the shape it ought to have been in when I commenced than I do now to finish it. Do any of our readers find themselves in the same row of stumps? If so, buy a gas engine and sweat no more. I put in a gasoline engine of 3-horsepower three and a half years ago. The principal reason was to run a saw by power. I not only consider it a good investment but I would not run a shop without one again.

As to the kind of power, I don't know enough about electricity to judge whether it would be best where obtainable or not, but I think gas or gasoline far better than steam for small shops. In a general way the benefits derived from the use of power are a saving of time, labor and material, better finished jobs, increase of business and profit, besides the ability to do much of our regular work more satisfactorily. We can do many things profitably by the use of power which we could not without. Almost every community affords a chance for some special work. In one place there may be considerable lathe work and no machine shop near. In another place

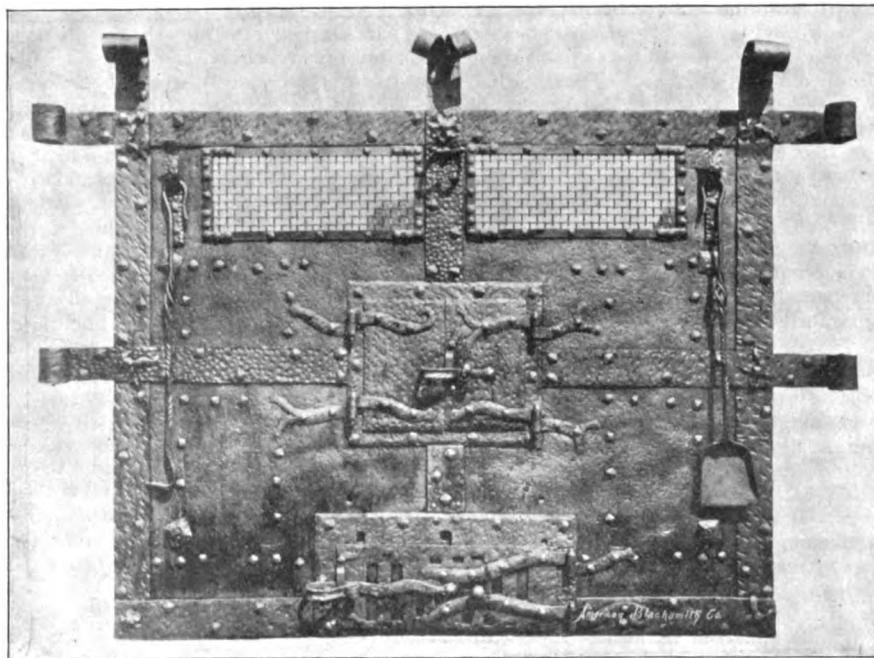
drill and emery wheels with power as needed. I do not run either the engine or my blacksmith fire steadily enough to make it profitable to attach a blower.

Prize Article No. 2.

J. S. SHAFER.

In reply to the question "Are gas engines a good investment?" I will say that I think so, for the following reasons: First, they are cheap in operation; secondly, they are ready at a moment's notice; thirdly, a 2-horsepower gasoline engine will turn everything in an ordinary shop. I have a lathe that swings sixteen inches, also an emery wheel, a power drill, a rip saw, a feed grinder and a buzz saw (26 inches), and I get along very nicely with it. The size of my engine is 2-horsepower, hot tube, Cinz make.

My engine increases my income at least one-third. Furthermore, it is a great labor-saving device. When it comes to turning a large drill by hand, life is too short for a man to wear himself out doing work by hand that could just as well be done by power. I had a steam engine before, but sold it and put up a power windmill. That was all right when the wind was blowing, but I sold that and put in the real thing—a gasoline engine. I must say that it is the only thing. A motor of course is very handy, but as a



A WROUGHT IRON FURNACE FRONT.

there may be considerable ripping to do for other mechanics. I get a run of work grinding chilled cast-iron plow points for farmers. Also we have a Swiss cheese factory here using tubs of different diameters for shipping cheese. They sawed out their round heads by hand until I built a jig saw. Now I mark them out, saw and nail them. I also gum saws as well as make and turn up wood pulleys for myself and others. I derive less benefit from my blacksmith work than from the wood work, although I run my

general thing you are not in a position to put in an electric motor. As for steam engines, they require a man to attend to them; another thing is this, you will have to wait an hour to get up steam, and after you have used it for twenty minutes you must shut down, and then you have a heavy head of steam and don't know what to do with it. You will find you can run a 2-horsepower gasoline engine all day for what it will cost to get a steam engine ready. As for the make, I would recommend the Fairbanks, Morse & Co.,

or the New Erie or the Foos. They are good engines, but there are other good makes. I mention these three as they are the first to come to my mind, and I know they are good engines.

Prize Article No. 3.

E. H. BREWER.

I notice you ask for opinions as to power in the blacksmith shop, and also if the gas engine gives perfect satisfaction. In regard to the gas engine I have, I consider it a complete success. I have had the same in my shop for four years, and to date it has not cost me one cent except for fuel, and has never failed to run. I consider the gas engine far superior for the blacksmith to the steam engine, as it requires no care. Also one can polish a plowshare or set of shovels and make a little money on them, where with steam it would be impossible for the smith to do the work and make any money. The gas engine which I use is the Davis, made by the Davis Gasoline Engine Works Company, Waterloo, Iowa, three or four horse-power. I have a power hammer for plow work, an emery wheel stand, a disc sharpener, power drill, blower for two fires, and a 16-inch circular saw for sawing material about the wood shop. I can run any or all of these machines with the engine at any time. The beauty of the gas engine is its low cost of running. I have run mine twelve hours on five gallons of gasoline. I consider the gas engine a paying investment for the shop as power. Of course it may make some difference with regard to the gas engine, but I prefer gas to steam, if for no other reason than the cost. As we smiths all know that this is an age of progress, why not keep step with the procession; if in other lines it pays, why not in the blacksmith line? It enables the smith to do more work in a day and better pleases his customers, besides taking a lot of hard work from him. I am in favor of the gas engine for the shop as power.

Competitive Article by A. A. Schaeffer.

Noting your request for an article on the gas engine, I would say that I am using a $2\frac{1}{2}$ -horsepower Weber Junior gasoline engine, and I tell you I am pleased with it, as is everybody else who sees it. It is of horizontal type and does not consume much oil, so that the expense of operating it is small. I run a drill press, an emery wheel and a disc sharpener with it. When two of us are grinding it does not seem to affect the power any more than with only one of us working. In these days it is hard work to pound out a living with only hand tools. Try as he may, the smith without power will find himself handicapped when in competition with a neighbor who has an engine. The man with the engine can do his work more quickly and cheaply, as well as more easily. It is going to be with the smith a good deal as it was with the old-time tanners who tried to eke out a living by making coffee pots, pans and dippers by hand. They awoke to find machinery for cutting out the various parts so that they themselves could buy a machine-made coffee pot cheaper than they could make one. To put in small

machines and a gas engine will prove the most profitable investment a smith can make. Hammering, drilling and grinding should be done by power. A gas engine invites trade, and will prove profitable if only for running a blower, an emery and a few home made machines. Machinery and power lift a heavy burden, and none of the craft appreciate it more than the smiths who have spent years swinging a sledge, or the smiths who are aging. Many a smith has sold his shop because he could not stand the heavy hand work, whereas he would probably have been able to have continued at something had he had a gas engine to help him. It is certainly the most profitable helper he could have. It saves lots of hard work and brings trade, as a man can do his work quickly. It would pay any smith to get an engine if only for pulling the emery and the blower, as he will surely find it profitable later on to add a hammer, drill press, etc.

Competitive Article by Wm. Exline.

Two years ago this winter I did not have any power, and my shop was only 24 feet long by 16 feet wide. Now I have a shop 80 by 35 feet. A gasoline engine will pay for itself the first season. Before I put one into my shop I could not do one-third of the work, so that another shop started up in the neighborhood. Inside a year after I put in power they sold out to me.

I can sharpen nine plowshares an hour and not hurry, where four is good work by hand. If I wish I can sharpen twelve in an hour. I have a Little Giant hammer, the best I ever saw, two forges, a Roat's blower, an emery wheel, a drill, a disc sharpener, a grind stone, a band saw, a circular saw, a 12-inch planer, using a $3\frac{1}{2}$ -horsepower Dempster engine for the whole. Every bit of this machinery has paid for itself since I got it. I have everything handy and everything in sight. I made many of my own tools, including a band saw, a planer and a lathe. I should never have made them without my engine. I have a "Motsinger Auto-sparker" on my engine, and it cannot be beat. Nobody should run a gas engine without one. It is always ready to go and does not freeze up as a battery does. I sharpened close upon 800 shares this season, from July 15th to September 1st, receiving from 25 to 30 cents for each. I guess one man could not have done that by hand, but a gasoline engine can, easily. It costs me 70 cents to run ten hours. I have water run just where I want it from a tank windmill.

I am twenty-five years old; I have been at the good old trade all my life and expect to stay at it for the rest of my days, for I love it.

Competitive Article by C. L. Carton.

Regarding the advantages of a gas engine, I would state that I put in a gasoline engine of $2\frac{1}{2}$ horse-power some eight months ago, to run an emery wheel and drill press. I soon found, however, that I had been doing a great deal of hard work and consuming a great deal of time that could be saved by putting in more machinery. So I have added a rip and crosscut

saw, and recently a trip-hammer. I don't see how I did business before, and surely think it a good investment for any smith that is doing anything like a profitable business (or wants to).

As to special benefits, I consider that the saving of time and labor, the better work and the fitting up of my shop has been the best advertising I have ever done. Trade will go where work is done quickly and in an up-to-date manner. In my shop, 20 feet wide by 80 feet long, I have my engine, saws, drill press, Henderson tire-setter, trip-hammer and two forges, and still have room to shoe horses (which, I regret very much, I cannot make the engine do). I should advise any brother smith to get an engine of not less than 4 horse-power, for he will soon find that he can use it in so many ways that the smaller one will be too light for his work.

This is my experience, and what I think of a gas engine in an ordinary blacksmith shop.

Competitive Article by C. W. Lewis.

With regard to gas engines, I would say, for the benefit of my brother smiths, that I have an engine in my shop and could not do without it. It takes off more than half the hard labor; the work is done faster and better; it saves fuel.

It does not take a large shop. If you have a small shop, build your engine room to one side so as to put your line shaft overhead. Put idlers on the line shaft so that when running one piece of machinery the others may be stopped. By so doing you save fuel. Place all machinery in line on one side of your shop. I run a general repair shop with a $2\frac{1}{2}$ -horsepower engine, and the fuel costs only 25 cents a day.

Competitive Article by C. W. D.

In regard to the advantages of the gasoline engine over steam, I can say this: With the gasoline engine you have power any minute in the day. If you want to grind a drill or drill a hole; if you are pointing a plowshare or set of cultivator shovels and want to finish them on the emery wheel, all you have to do is to open your oil cups, give your pump a few jerks, roll your wheel and you are running; when you get your job done one twist of the hand stops all expense. I have a 6-horsepower Lewis engine to run an emery wheel, trip-hammer, blower, drill press and saw, and have two or three horse-power to spare. It costs me about thirty cents for a whole day, as my engine does not use any more oil than is necessary to do the work.

I have had my engine seven years, and it runs better than a steam engine that has been in constant use for that length of time. One dollar will cover all repairs since I have had it. On the other hand, if you have a steam engine in a blacksmith shop, unless you have a tall, expensive smokestack that takes your smoke above the other buildings, which are sometimes 45 and 50 feet high, many days you will find you can hardly get up steam, if the wind is not just right. Then you cannot fire up any time with less than one dollar's worth of coal. With a steam

engine, if a man has his mind on his work, he is liable to forget to tend to his engine at the proper time, thus causing serious results from low water or many other things. With the gasoline engine, when your gasoline pump fails to raise the supply the engine stops, and that is all there is to it. Or it may be a leaky joint in the pipe. Sometimes maybe a little chip or grain of oats works its way into the check valves so that they cannot seat themselves to hold the gasoline. These are the main causes of trouble. Of course you should get good gasoline cylinder oil. If you get a good standard make of gasoline engine for your shop you will have good power and just as you want it.

Competitive Article by M. Schrodt.

I have had a gas engine about ten months and find it a great labor saver. A man can do double the work that he can with a blower or bellows, because he can get his iron hot sooner, and while one piece is heating he can work another on the anvil, in such work as calking shoes. When he gets at the drill press he can drill more holes in one hour than he can in three by hand, and won't be all tired out. He can also do his grinding and sawing.

I have the Bates and Edmonds engine, $2\frac{1}{2}$ -horsepower, which is advertised now in THE AMERICAN BLACKSMITH. It is a very simple engine, and I find it a valuable machine. No blacksmith ought to work without one. He can easily do enough extra work in two months to pay for the machine. As to the cost after he gets the machine, this is light—ten cents a day for the $2\frac{1}{2}$ -horsepower, which I have, which is large and powerful enough for any ordinary shop. I run a blower, drill press, grinder and rip saw, and could run more if I had them. I was the first blacksmith who put in an engine in Watertown. Since I have put in one there have been large numbers of smiths in my shop to see it work, and they all say it is fine and they must have one. When I tell them how much I do with it and how little expense it is they are more than surprised.

Competitive Article by R. T. D.

A certain smith labored for two years adding what small hand tools he could to his stock. One of the first was a blower to take the place of a bellows. Finally he bought an engine, a $1\frac{1}{2}$ -horsepower Fairbanks-Morse, and put in an emery wheel and rip saw. His work increased. He was now able to undertake jobs that he could not have thought of before. Naturally, too, he could do everything much more quickly—a fact which brought custom. Finding he could not keep up with his work he hired an apprentice for one year and enlarged his shop. Then he put in a planer, a wood lathe, sand belt, screw cutting lathe and band saw, all within a little over a year. He now keeps a hand and they have all the work they can do. I will say right here that the engine can pull any one of the machines at a time, and any two or three of the light ones, such as the drill, blower or lathe, but if I were buying an engine, I would buy a 3-horsepower Fairbanks-Morse engine, which I think is plenty large enough for a small shop.

Competitive Article by M. L. Beal.

With regard to gasoline engines, I think that it matters but little as to the size of a shop. If one man alone in a shop with a reasonable trade can afford a gasoline engine, it is a labor and time saver as well as a helper to any up-to-date blacksmith.

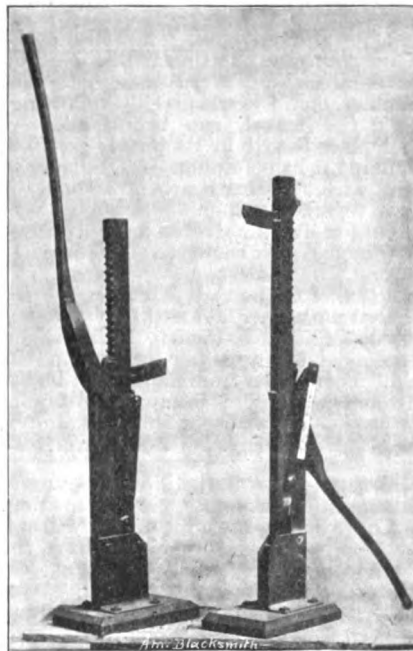
But let me say a word before going further. Do not put in a gasoline engine without the electric spark attachment. If a man has a gasoline engine in his shop without the spark, he loses valuable time waiting for heat. A gasoline or gas engine with the spark attachment is ready to start on a minute's warning, and furnishes sufficient power for the average smith cheaper than any power on the market today. An engine without the spark is little better than steam, for it takes so long to heat the carbon.

As to the size an engine should be, if a man has only an emery-stand, a pulverizer, a sharpener and a drill-press to run, a two or three horsepower gasoline engine is sufficient, but if he expects to keep up with the times and add to his machinery, he should not invest in less than a six horsepower engine. My experience has taught me that running the hammer, the emery-stand, the pulverizer machine and the drill-press by power is a great labor saver. I can do more work with less exertion by having an engine than I could without. And more, I will say that no shop is complete without an engine and the above mentioned machinery. For my part I would not be without one under any consideration.

How to Make a Wagon Jack.

L. VAN DORIN.

The wagon jack shown in detail in the illustrations herewith is the best thing of its kind I ever saw. It weighs six-

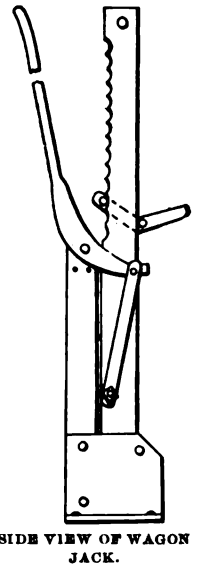


A HOME MADE WAGON JACK.

teen pounds, and will lift a wagon with 4,000 pounds on it. I sell them for \$2.50 with a fair profit, so that it is an excellent thing for a smith to know how

to build to fill in spare time with. I make them of steel, with the exception of the lever.

The jack is shown in two positions in the engraving, lowered and raised. The base is formed of two $\frac{1}{2}$ -inch plates, 4" x 6", bent, punched and riveted as shown. This base supports two uprights, one movable and 25 inches long, the other rigidly attached to the base and 14 inches long. Each of these two parts is made double, out of $\frac{3}{8}$ " x $1\frac{1}{2}$ " soft steel. The lever is made with a forked end, and is pivoted on a steel pin running through the upright. The lever crotch is of tire steel $\frac{1}{2}$ " x $1\frac{1}{4}$ ", having a $\frac{5}{8}$ -inch round handle 24 inches over all. The end of the lever connects by two links, $\frac{3}{8}$ " x $\frac{1}{2}$ ", with the movable



upright. Both bars of this upright are notched as shown, to prevent the slipping of what I term the shifting dog when the jack is loaded. This dog is made out of tire steel, $1\frac{1}{2}$ " x $\frac{1}{4}$ ", with two short pins made fast by upsetting. To hold the movable upright in place I rivet a piece of iron $\frac{1}{2}$ " x $\frac{3}{4}$ ", between the two parts of the stationary upright, and this has a T-shaped end for holding the movable piece in its proper vertical position.

It is scarcely necessary to describe the operation of this jack. It may be mentioned, however, that when the handle is thrown down the connecting links should pass by the fulcrum or turning point of the handle lever and thus lock itself.

An Electrical Phenomenon.

Will the time come when blacksmiths generally will adopt electrical power in their shops, just as they are doing with the gas engine today? A contemporary informs us that a certain manufacturer has now completed his electric welding plant, and is welding cylinders with it at the rate of 300 to 800 welds per hour. The only requisite is a smart boy to operate the machine.

One question! Does the smartness of our boys increase in proportion to the development of electricity? It would take a very smart boy, we think, to conduct the work mentioned.

Prices Current — Blacksmith Supplies.

The following quotations are from dealers' stock, Buffalo, N. Y., December 23, 1902, and are subject to change. No variations have occurred since last month's figures.

All prices, except on the bolts and nuts, are per hundred pounds. On bars and flats prices are in bundle lots.

Bars—Common Iron and Soft Steel.

1/4 in., round or square; Iron, \$3.10; Steel, \$2.90
3/8 in., " " " 2.70 " 2.70
1/2 in., " " " 2.50 " 2.40

Flats—Bar and Band.

1/4 x 1 in., Iron, \$2.50; Steel, \$2.40
1/4 x 1 1/2 in., " 2.40; " 2.40
3/8 x 1 1/2 in., " 2.60; " 2.60

Norway and Swedish Iron.

1/4 in., round or square, \$4.90
3/8 in., " 4.50
1/2 in., " 4.30
1/4 x 1 in., " 4.30
3/8 x 1 1/2 in., " 4.20

Horseshoe Iron

For No. 1 shoe, 3/8 x 1 1/2 in., \$3.40
For No. 2 shoe, 1/2 x 3/4 in., 3.00
For No. 3 shoe, 5/8 x 3/4 in., 2.90
For No. 4 shoe, 3/4 x 3/8 in., 2.90

Toe Calk Steel

1/2 x 3/8 in., and larger, \$3.50

Spring Steel.

5/8 to 1 1/4 in. Rounds, Op. Hearth \$4.00, Crucible \$6.00
1/4 to 6 in. by No. 4 gauge to 1/2 in. Flats, " 4.00, " 6.00

Carriage Bolts. (Net Price per Hundred).

1/4 x 2 in., \$0.54	3/8 x 2 1/2 in., \$0.82
1/4 x 2 1/2 in., .58	3/8 x 3 1/2 in., .96
1/4 x 3 in., .62	1/2 x 6 in., 1.81
5-16 x 2 in., .65	1/2 x 4 in., 1.70
5-16 x 3 in., .75	1/2 x 6 in., 2.10

Tire Bolts (Net Price per Hundred).

3-16 x 1 1/2 in., \$0.18	1/4 x 1 1/2 in., \$0.28 1/2
3-16 x 2 in., .21	1/4 x 2 in., .31 1/2
3-16 x 3 in., .27	1/4 x 3 in., .37 1/2

Hot Pressed Nuts. (Blanks)

1/4 in., \$0.09 lb. net
3/8 in., .06 " "
1/2 in., .05 " "
3/4 in., .04 7-10 " "

NOTE.—Base prices or most common sizes are listed above. Should subscribers desire net prices upon other sizes than those given, same will be published in following issues.

FOR SALE.—Owing to poor health, I have decided to sell my blacksmith shop and tools. This is a splendid location and good trade, and good prices. **W. J. Sisson, Sterling, Colo.**

FOR SALE.—For one dollar. New ideas and new methods for working steel by using Toy's hand-colored charts. Chart A explains hardening to any degree. Chart B explains scientific and plain tempering in oil, water or tallow, showing true color each tool should be and telling what it will stand. Also 40 new steel working methods on plow and machine forging, with five of the best steel welding compound receipts in use for all the new steels made. All for \$1.00. Samples Free. **W. M. Toy, Sidney, Ohio.**

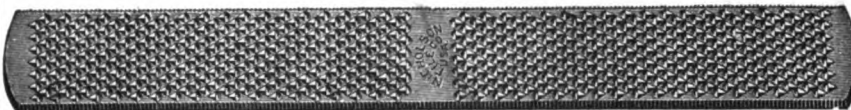
NICHOLSON FILE COMPANY

PROVIDENCE, R. I., U. S. A.,



NICHOLSON.

MANUFACTURERS OF

**FILES AND RASPS**

Blacksmiths Recommend our Rasps.

BECAUSE*Their Wearing Qualities Have Been Proven.***MORSE TWIST DRILL & MACHINE CO.**

New Bedford, Mass, U. S. A.

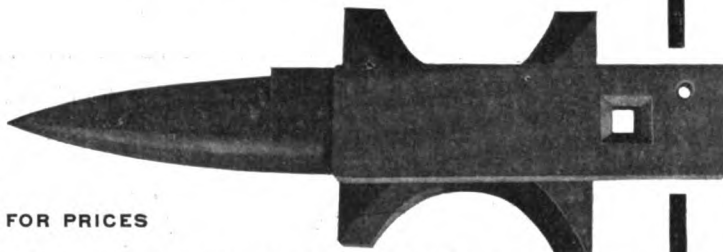


A WORD TO BLACKSMITHS: We can supply you to your advantage with Drills of good quality and prices to suit. We would be glad to have your orders for such tools as we manufacture. Send for Catalogue and note the many kinds there listed.

"LOOK AT THIS"



THEN "LOOK AT THIS"



WRITE FOR PRICES

We Are Experts at Repairing Old Wrot Anvils.

COLUMBUS ANVIL AND FORGING CO., Columbus, O.

BLACKSMITHS, HORSESHOERS, WHEELWRIGHTS: If you are in sympathy with the movement described on page 74, sign and send the blank below. Send money orders, express orders or stamps, but not checks.

AMERICAN BLACKSMITHS & HORSESHOERS' ASSOCIATION,

453 WASHINGTON STREET, BUFFALO, N. Y.

Please enroll my name as in favor of securing in this State a Blacksmiths and Horseshoers' Lien Law, and other legislation favorable to the craft. I agree to use my influence personally and by correspondence with our representative in the State Legislature.

I enclose \$1.00 in payment of a year's subscription, beginning February, 1903, to THE AMERICAN BLACKSMITH, the official organ of the movement. NOTE.—If you are already a paid subscriber, scratch this out.

Please send me your plans of forming local county associations.

Name and Address.....

Town..... County..... State.....

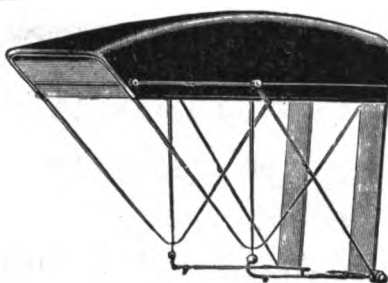
Prof. Wm. Russell On Scientific Horseshoeing

ranked as the highest authority on the subject of shoeing. My Sixth Edition has over 550 cuts of shoes, feet and legs, and 372 pages. The value of the horse depends upon soundness of the feet and legs, and the soundness of the feet and legs depends upon the good judgment of the shoeer. The man that knows where to cut and when to stop cutting is an artist in his profession, and I would say to him who has any doubt, "Beware and not cut too much, as only time can replace the damage, which means loss of money to the owner, and in many cases an early death to the horse." Every horse owner ought to have a copy to know when his horses' feet are properly balanced. Every man that shoes horses should have a copy to know how to pare the feet so as to keep them natural. No rule can be given to shoe any two horses alike, as there are scarcely any two horses shaped and gaited alike. The style and weight of shoes that would suit one horse would not be suitable for another. The long pastern horse wants to be shod with a long toe, while the short pastern horse wants to be shod with a short toe. In my experience as a practical horseshoer for 64 years, as time changes all things change, and the Farrier must keep up with the march of improvements. There is a cause for all things; first find the cause, then by removing the cause the effect ceases.

My Sixth Edition is published by the ROBERT CLARK CO., 31-35 East 4th Street, Cincinnati, Ohio.
Price, \$4.00. Charges prepaid.

PROF. WM. RUSSELL,
1722 FREEMAN AVENUE,

SEND FOR A COPY. CINCINNATI, OHIO.



Buy Carriage Tops, Seats and
Trimmings of

C. A. HALLIDAY

And get goods that are O. K. as to
QUALITY and STYLE. Write for
1903 Catalogue.

C. A. Halliday,
24 Cedar St., - ONEIDA, N. Y.

Trade Literature and Notes.

We have just been informed that the Weber Gas & Gasoline Engine Company, Kansas City, Mo., have increased the capital stock of their incorporation from \$150,000 to \$200,000. This company has been engaged continuously since 1884 in the manufacture of gas and gasoline engines, and has just completed a new factory at Sheffield. They are shipping engines all over the world, recent foreign shipments going to Ecuador, Peru and Australia. The company's business in the neighboring republic of Mexico is quite extensive.

The Kalamazoo Wagon Company, Kalamazoo, Mich., sends a very tasty 24-page catalogue, illustrating and describing their handsome complete line of wagons for the season of 1902. The catalogue will well repay sending for to anyone interested in the slightest in wagons and the like.

The Columbus Anvil and Forging Company, Columbus, Ohio, sends us their folder of the "Arm and Hammer Anvil," which they state is a superior product. A handsome mailing card from the same firm sets forth an interesting line of work which is done by this company, consisting in the repair and working over of old and battered anvils. The cuts show the old anvils to be finished up as good as new.

It is a pleasure to review a catalogue so handsomely attractive as the 24-page book which the Columbus Machine Company, Columbus, Ohio, have just sent us, describing their portable, stationary and electric types of Columbus Gas and Gasoline Engines. The catalogue will repay sending for by any interested in the subject of gas engines.

Ernest G. Smith, Columbia, Pa., sends us his neat 16-page booklet showing his Vernier calipers, levels and other tools, making a very interesting catalogue.

A 12-page catalogue from Geo. Sears & Company, Clinton, Pa., treats fully of the punches, shears and bar cutters, their construction, operation and advantages.

From the Carl Anderson Company, Chicago, Ill., comes a neat catalogue, illustrating the "Gus" gasoline engine and various applications to which the same may be put. This is a very interesting catalogue.

A 4-page folder from A. A. Wood & Sons Company, Atlanta, Ga., sets forth the many advantages of their hollow augers and spoke shaves, which tools appeal strongly from many points to the carriage woodworker.

A 64-page catalogue which has just come to hand from the E. F. Reece Company, Greenfield, Mass., shows their improved bolt cutter, screw plates, tap and die holder, etc., for blacksmiths' use, and is a book which all blacksmiths could send for to advantage.

The Columbia Carriage Company, Hamilton, Ohio, sends us one of the handsomest catalogues which has come to this office for many days, and illustrates the big line of carriages which this company places upon the market.

The Steel Wheel and Wagon Company, Pueblo, Colo., have issued a handsome catalogue, showing their line of heavy wagons, and will well repay sending for. This concern manufactures steel wheels, steel wagons, steel gears and steel wagon beds.

A 32-page booklet of the International Steel and Machinery Company of New York City deals with the various grades of tool steel manufactured by this company, indicating also what each brand is

The Best Flux known for Welding



And MALLEABLE Iron to Steel.

SEND FOR SAMPLES (NO CHARGE),
CIRCULARS, PRICE LIST, AND NAME
OF NEAREST DEALER 3 3 3 3 3

Cherry Heat

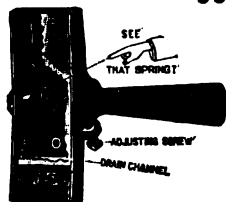
Sole Manufacturer

The Welding Compound Co.

PATERSON, N. J.

Only firm in this line awarded DIPLO-
MAS and GOLD MEDALS at CHICAGO
EXPOSITION, 1893, and OMAHA EX-
POSITION, 1896.

"Spring" Brake Blocks



For all Kinds of Vehicles, light or
heavy. Wear Shoes fitting these
Blocks adapted to either steel or
rubber tire.

MORGAN POTTER, Sole Manufacturer,

CATALOGUES.

FISHKILL-ON-HUDSON, N. Y., U. S. A.

THE OLD RELIABLE

GUARANTEED

**BANNER
welding
COMPOUND**

Send for
Free
Sample
and
Prices

The Blacksmith's Friend.

Welds at low heat Iron to
Iron, Steel to Steel. Malle-
able Iron to Tool Steel.

No. 3 welds Axles, Springs, Steel Tire and gene-
ral work—medium fine.

No. 4 for Brazing or Welding Knives, Scissors,
Bow Sockets, etc.—fine.

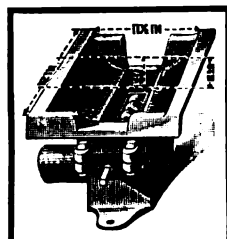
No. 5 for Anvil Welding and heavy work—
coarse.

Sole Manufacturers,

The CORTLAND SPECIALTY CO.

CORTLAND, N. Y., U. S. A.

THE CYCLONE TUYERE IRON



AND
**COMMON SENSE
FIRE BOX**

IS NOT THE LOWEST
PRICED, BUT THE
CHEAPEST.

It will last a life time,
and pay for itself in a
short time. Requires

no clay or plastering. Have been sold all over
the United States and Canada under a guarantee
and none returned. It stays and gives satisfac-
tion. If your fire is not up-to-date, do not im-
agine you need a new bellows or fan, as nine
times out of ten the fault is with the tuyere iron.
A Cyclone will surprise and save you money.

Mr. Wright, of Lone Oak, Texas, tried most all
makes. Did not get satisfaction until he got a
Cyclone. Send for circular.

John H. Wiestner,

3556 Frankford Ave., Philadelphia, Pa.

suitable for, together with instructions for the treatment of the same.

Bittenbender & Company, Scranton, Pa., sends a very comprehensive 800-page catalogue fully illustrating and describing the large and complete line of supplies and heavy hardware for blacksmiths and wagonmakers—a very interesting book.

The Havana Metal Wheel Co., of Havana, Ill., informs us that since their disastrous fire of last September, they have re-arranged their full factory equipment, adding new and special machinery for the manufacture of High Grade Agricultural Steel Shapes, of which they make the "Crescent" brand. Their goods are regarded with much favor where fine quality, shape and finish are recognized.



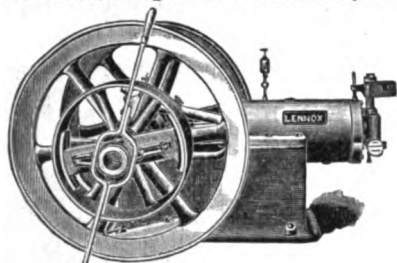
KICKING,

Balking, Shying or any kind of a habit cured in a few hours by my system. Particulars free.

PROF. JESSE BEERY, Pleasant Hill, Ohio.

Lennox Machine Co.

Manufacturers of the Lennox Stationary Gas and Gasoline Engines for General Purposes



Complete Blacksmith Power Outfits. Shafting, Hangers, Pulleys, Belting and Emery Stands.

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LENNOX MACHINE COMPANY
101 9th Ave., MARSHALLTOWN, IOWA

Leather Aprons

For the Jobbing Trade.

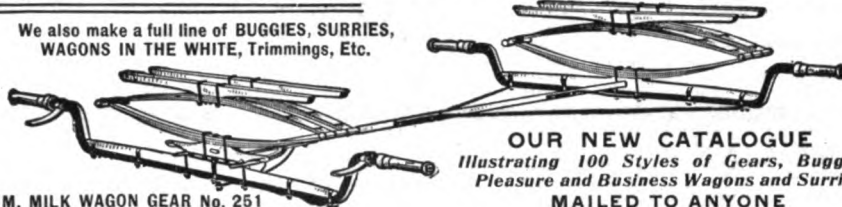


Samples of Leather and prices on application

The Hull Bros. Co.
Danbury, Conn.

GEARS-50 DIFFERENT STYLES FOR BUSINESS, SURREY AND PLEASURE WAGONS

We also make a full line of BUGGIES, SURREYS, WAGONS IN THE WHITE, Trimmings, Etc.



O. M. MILK WAGON GEAR No. 251

OUR NEW CATALOGUE
Illustrating 100 Styles of Gears, Buggies,
Pleasure and Business Wagons and Surreys
MAILED TO ANYONE

SCHUBERT BROS. GEAR CO.

ONEIDA, N. Y.

Cutters and Sleighs of All Kinds.



THIS is our twenty-third season of manufacturing sleigh goods, and we have a more complete assortment of up-to-date styles this season than ever before.

We are offering special inducements in the way of low prices for orders placed during the next thirty days.

Write for catalogue and price-list.

We can also furnish you some bargains in the carriage line, as we have a stock on hand that must be closed out to make room for our extensive line of cutters and sleighs.

This is a rare opportunity, and if interested we would be glad to mail you catalogue and prices.

KALAMAZOO WAGON CO.

BOX 305.

KALAMAZOO, MICH.

TO REMIND YOU.

The **BUFFALO**
ELECTROTYPE AND
ENGRAVING CO.

MAKES EVERY KIND OF PLATE FOR PRINTING USE % % %
HALF-TONE ZINC ETCHING WOOD & WAX ENGRAVING
ELECTROTYPES, NICHELTYYPES, EMBOSSED, BOX PLATES, AND THREE COLOR PROCESS

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Seneca 1344
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BUFFALO
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& CHARTS

"R. Mushet's Special Steel"

The Original Air-Hardening Steel

and STILL UNAPPROACHABLE in general excellence.
Thirty Years' Experience in Engineering Works in All Parts of the World
has Proved Beyond all Doubt that this Steel is in every respect

THE BEST TOOL STEEL

YET MANUFACTURED

Uniformity of Quality in Every Bar. A Great Saving in Steel, Time and Wages, and Easy to Work.

There are no difficulties to contend with in forging R. Mushet's Special Steel into tools and no loss in reheating. The best all-round Steel.

R. Mushet's HIGH-SPEED Steel.

If a fast cutting Steel is required, this is the best and most reliable of this grade. It will do more work than any other known Steel, and every bar is uniform and free of the "Cracking" so generally a feature in steels of this grade.

The "R. Mushet's" Steels are manufactured only by **SAMUEL OSBORN & CO.**, Clyde Steel & Iron Works, Sheffield, England.

Sole Representatives in the United States, Canada and Mexico:

B. M. JONES & CO.

159 Devonshire St., BOSTON. 143 Liberty St., NEW YORK.

1	THE L. S. STARRETT CO.	ATHOL, MASS.	U. S. A.	13 14
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2 feet long, 1/4 inches wide, folding in middle. Made of Best Quality Spring Tempered Steel

BLACKSMITHS Will find this Steel Rule just what they need. We send it post-paid for 50 cents.

Catalogue of Fine Tools Free.

The L. S. STARRETT CO.
ATHOL, MASS., U. S. A.

BARGAINS In Rebuilt Second-hand
GASOLINE ENGINES
Good as New
Also New Gas and Gasoline Engines
GET MY PRICES
J. MONTGOMERY JOHNSTON
216 LAKE STREET - CHICAGO, ILL.

**The New and Modern Method of
WELDING STEEL IS BY USING
MONARCH
WELDING COMPOUND**
It unites readily and makes perfect welds of Tool or Cast Steel under any conditions. Used the same as borax, though far superior and cheaper. Samples free to convince you.
W. M. TOY, - SIDNEY, OHIO.

COOPER GAS AND ENGINES



Built in Standards,
Pumpers,
Geared Bases, Etc.

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Engineer's License

**Mechanics, Electricians,
Engineers, Firemen, Etc.**

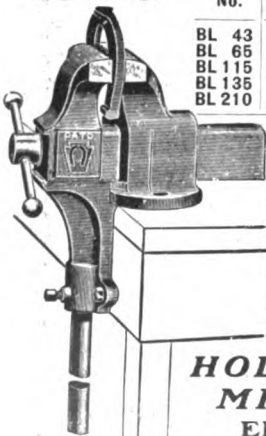
40-page pamphlet containing questions asked by Examining Board of Engineers. **SENT FREE!**

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New 96-page Catalogue sent
FREE to any part of the world.

KEYSTONE MALLEABLE BLACKSMITH VISE.

(With Inserted
Wrought Iron Leg.)



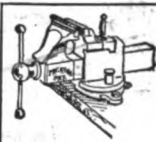
Opens Parallel

Figures in first column of table indicate weight. Strong as scientific design, with steel, wrought and malleable iron, can make it.

Any blacksmith can fit a "wrought iron" leg to this vise if it is desired.

**HOLLANDS
MFG. CO.**
ERIE, PA.

No.	Width Jaw	Opens	List
BL 43	4 in.	4 in.	\$16.00
BL 65	5 in.	5 in.	24.00
BL 115	6 in.	6 in.	37.00
BL 135	7 in.	7 in.	58.00
BL 210	8 in.	8 in.	90.00



PRENTISS PATENT VISES
ALL STYLES AND SIZES
FOR ALL USES
LARGEST LINE IN THE WORLD
ILLUSTRATED CATALOGUE - FREE
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Steel Stamps.
Steel Letters and Figures
Burning Brands
Stencil Dies, Stencils, &c.
GEO. M. NESS, Jr.,
61 Fulton St., N.Y.



Climax Welding Compound



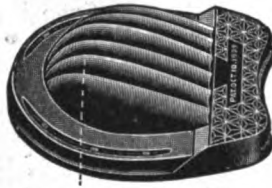
Welds all kinds of Steel as easily as Iron

Sample Free

For sale by dealers in Blacksmith's Supplies.

Manufactured only by
CORTLAND WELDING COMPOUND CO.
CORTLAND, N. Y.

AIR CUSHION Rubber Horseshoe PADS.



Highest Award
Buffalo Expo., 1901.

"A. C." Pads cure all ordinary cases of Foot Lameness.

"TRY THEM."

No Slipping.

No Balling of Snow.

Write for Illustrated Booklet M.



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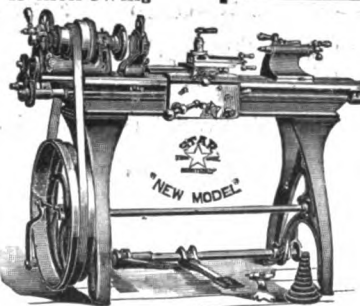
It fills with air at each step.
That's what breaks concussion.
That's what prevents slipping.
That's what keeps the foot healthy.
That's what cures lameness.

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BOSTON, MASS.

9-inch swing
11-inch swing
13-inch swing

FOOT AND POWER "STAR" LATHES



High-grade screw-cutting engine lathes with power cross feed, either plain, compound or raise and fall rests, U. S. Standard, Whitworth or metric lead screws; also draw-in chuck, gear-cutting, milling and tapering attachments.

Heavy, rigid, and, above all else, accurate. Suitable for electrical and repair work, tool-makers, gunsmiths, technical schools, and any shop requiring fine, accurate work. Send for Catalogue "B."

The SENECA FALLS MFG. CO.

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THE CRESCENT "EVEREADY" PLOWSHARE

Extra
Heavy
and Smooth
Upset Shin
on all Plowshares.



**SAVES TIME, PATIENCE
AND MATERIAL**

Can be fitted to plow easily, quickly. Are welded securely, point finished and fully ground and polished.

ORIGINATED AND MANUFACTURED BY

HAVANA METAL WHEEL CO., HAVANA, ILL., U. S. A.

Manufacture a full line of CRESCENT Steel Lister shares, Subsoilers, Cultivator Shovels, Landsides, Moldboards from Solid, Crucible and Genuine Soft Center Steels.

IF YOUR JOBBER DOES NOT HAVE THE CRESCENT WRITE US.
We are the Largest Manufacturers of Truck Wheels in all America

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Blacksmiths Need Not Suffer from Splints and Chaps

on their hands, for they can be both cured and prevented by Trade **SALVAREX** Mark. which makes the sorest hands comfortable in a couple of hours, and which **READE** is also a wonderful remedy for Old Sores, Wounds, Ulcers, Abscesses, Burns, Scalds, Corns and Eruptions of the skin generally. We will send by mail two boxes, one for the shop and another for the home, on receipt of \$1.00. There is nothing on the surface that it does not quickly cure. No house can afford to be without it, either for ordinary needs or for accidents. Prepared only by

READE MFG. CO., Chemists, 546 W. 22d St., NEW YORK CITY.

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A Book for Practical Smiths **MODERN BLACKSMITHING, RATIONAL HORSESHOEING and WAGON MAKING.** By J. G. Holmstrom.

WITH RULES, TABLES AND RECIPES. A necessity for Blacksmiths, Horseshoers, Wagon-makers, Mechanics and Apprentices. \$1.00 POST-PAID. **American Blacksmith Company** P. O. DRAWER 974. **BUFFALO N. Y.**

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GOODYEAR TIRE & RUBBER CO.
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5 HEAVY
GOODYEAR
5 HEAVY
PHOENIX BAR—CANVAS BACK

Heavy Heels . . .
— for —
. . . Winter Wear
USED WITH TOE CALKS THE PRICE IS RIGHT ASK FOR THEM
Goodyear Tire & Rubber Co.
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"TRINITY TRUE"**HIGH SPEED TOOL STEEL**

PLENTY LATITUDE FOR HEATING.

EASY TO MACHINE.

NO TRICK IN TEMPERING.

ESPECIALLY DESIGNED FOR HEAVY CUTTING.

BEST STEEL FOR HOT WORK.

WESTMORELAND STEEL COMPANY, - - PITTSBURGH, PA.

WHEELWRIGHTS' TOOLS

We are sole manufacturers of the Celebrated Wood's Universal Hollow Auger

($\frac{1}{4}$ in. to $1\frac{1}{4}$ in.). Every part steel; wearing-parts and screws hardened.

Also FORE AUGERS,

SPOKE POINTERS, SHAVES,

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suit you; they

are the best. If

your dealer has none

(almost ALL Jobbers

carry them), kindly write us. Let us send you

illustrated circulars. All inquiries receive instant attention.

THE A. A. WOOD & SONS CO., Atlanta, Ga., U. S. A.

**A MONEY MAKER**

PAYS FOR ITSELF IN ONE DAY'S USE.

FOR HAND or POWER USE.

Thousands have been sold all over the United States and foreign countries.

WE HAVE EMERY GRINDERS TOO. Send Postal Card for Circulars and Lowest Prices.

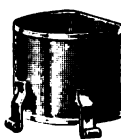
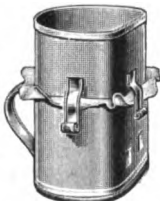
CLARK MANUFACTURING CO.
Station A. MOLINE, ILL. U. S. A.

Every Carriage Shop

HAS USE FOR ONE OF OUR
PERFECTION VARNISH CUPS
PRICE \$1.00, POSTPAID

READY FOR USE.

READY FOR STRAINING.



STRAINING CUP.

VARNISH CUP.

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You get one for nothing with your first order amounting to \$10.00 or more.

WE issue a special price list of just the things carriage painters want and nothing else. The prices are net, cash-with-order-prices; nothing added for expenses or collections. All your money goes into the goods. The best way to buy and sell.

We will mail this sheet to you if you will mention this paper. You will buy from it if we do—the prices are right.

GEO. E. WATSON CO.

108 LAKE STREET, CHICAGO, ILL.

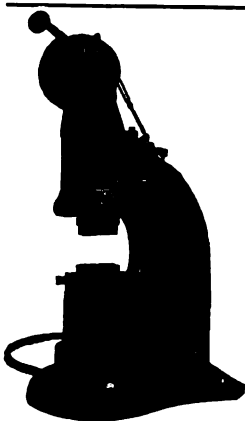
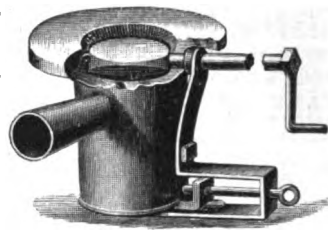
Send for net price list "B" of Carriage Painters' Supplies.

"The Best Heating Tuyere-Iron in the Market."

Mr. A. Pfafenbach, of 5673 Centre Ave., Pittsburgh, Pa., says: "I have been in the business for 35 years, and have found Ehr Gott's Tuyere-Iron to be the best heating and best wearing tuyere in the market."

Our Irons are air-tight, heat faster, burn less coal, and are easier managed than any others. And our prices are right. Money back and freight paid if not as represented. Write for free circular and testimonials to

W. A. EHRGOTT, - 243-5 Greene St.,
BROOKLYN, N. Y.



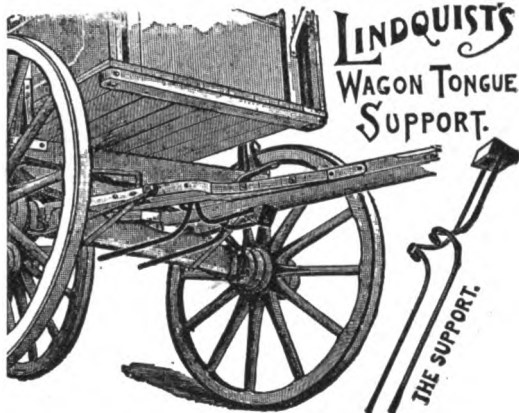
The Beaudry Champlon POWER HAMMER IS THE BEST

12 SIZES, 50 to 500 lbs. Weight of Ram

12 PRICES, - - - \$300 to \$1100

ADAPTED FOR EVERY DESCRIPTION OF FORGING

Beaudry & Co. 8 Oliver Street
BOSTON, MASS., U.S.A.



PATENTED JANUARY 20, 1891
SIMPLEST AND BEST.

Hold up that Wagon Tongue
... WITH ...

**Lindquist's
Support.**

Made in 2 Sizes, $\frac{3}{4}$ for Heavy Wagons
and $\frac{1}{2}$ for ordinary Farm Wagons. . . .
Blacksmiths and Dealers Make Good
Money by Selling It.

Has Large Sale Among Farmers.
All Wagon Owners Want it.

Write us Today for Prices.

The Heavy Hardware Co.
Toledo, Ohio.

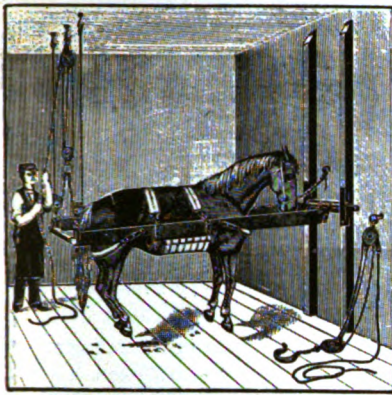
Metal Shingle
Roof
Covered with
Montross
"Victor"
Metal Tile.



Metal Shingle Roofing

METAL SHINGLE ROOFING with
Montross Telescope Side-lock makes the
best covering in the world for Residences,
Factories and all buildings with pitched
roofs. Easily applied. Cheaper than Slate
or Wood Shingles. Fire and Storm proof.
Five different sizes and designs to select
from. Catalogue, prices and testimonials
free for the asking.

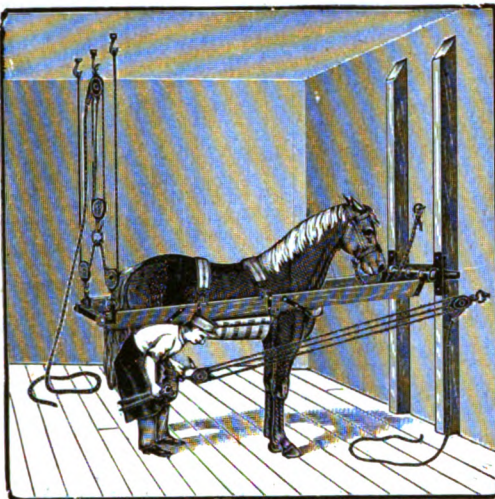
Montross Metal Shingle Co., Camden, N. J.



Horse in position ready to lift.

The strongest, most simple and convenient rack made. Safety to man and beast. No cranks or levers; they are too slow. The self-locking hoist is sure and simple — operated in $\frac{1}{4}$ the time of any other. Price is low. Write us for circulars and prices.

HUNT, HELM,
FERRIS & CO.,
Harvard, Ill



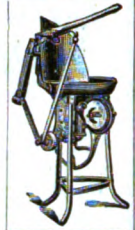
Foot in position for clenching.

Safety Horse Shoeing Rack.



DON'T

think we are going to tell you about all the good points in OUR GRINDING MACHINES AND PORTABLE FORGES in the little space we have in this paper. You will have to



READ

my latest catalogue and circulars to get even a faint idea of the real merits of our goods, and our proposition to the Blacksmith trade, it's a corker; every one as represented or money refunded. Our internal anti-rattle rachets DON'T WEAR OUT. Our Grinders are made to grind and our Forges to heat.

Good goods, right price.

Write us at once. . . .

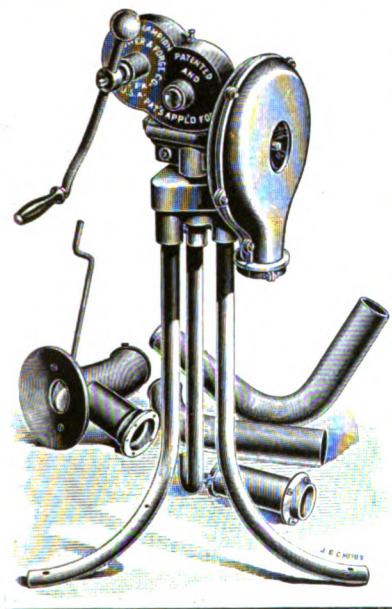
THIS

is our address,

H. L. CHAPMAN,
Marcellus, Mich.
Box A 64.



Blacksmiths' Supplies.



No. 400 Blowers and Forges.

Which are unsurpassed in style, quality and efficiency in work, and which give every horseshoer and blacksmith who purchases them better value for his money than any other investment he can make.

SLIGO IRON STORE COMPANY,

945-953 N. Second Street,

ST. LOUIS, MO.

In our stores, ware houses and woodyards will be found all articles and material which enter into the construction and finish of a vehicle, be it an ordinary farm wagon or the finest coach. Also all tools, supplies and machines that are used by the horseshoer, blacksmith and woodworker.

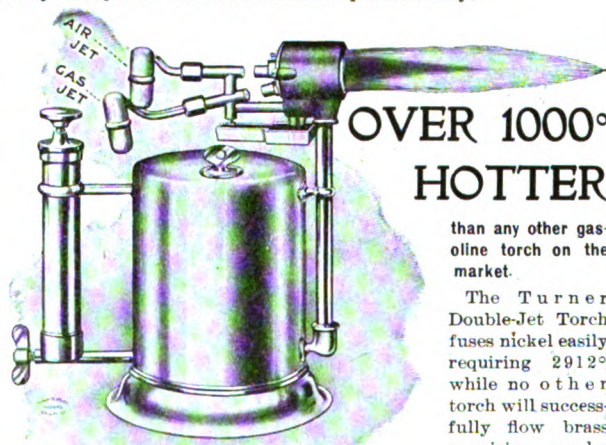
Our stock is new and up-to-date, and includes all the latest improved tools and labor-saving machinery. Among these we call special attention to the celebrated and meritorious line of

The TURNER GASOLINE Double-Jet Torch



FOR BRAZING, TEMPERING, DRAWING TEMPER, ANNEALING, BURNING OFF PAINT, SOLDERING, OR ANY OTHER WORK REQUIRING HEAT, THIS TORCH IS MORE THAN TWICE AS GOOD AS ALL OTHERS.

We call it DOUBLE JET because the burner is constructed with two separate and distinct jets, an air jet and a gas jet, which are independently controlled and operated. These two jets enter the combustion chamber separately, and are there united and shot forth into one intensely hot pointed flame of about 3500 degrees which can easily be adjusted to a broad flame of equal intensity.



OVER 1000°
HOTTER

than any other gasoline torch on the market.

The Turner Double-Jet Torch fuses nickel easily requiring 2912° while no other torch will successfully flow brass requiring only 1873° of heat,

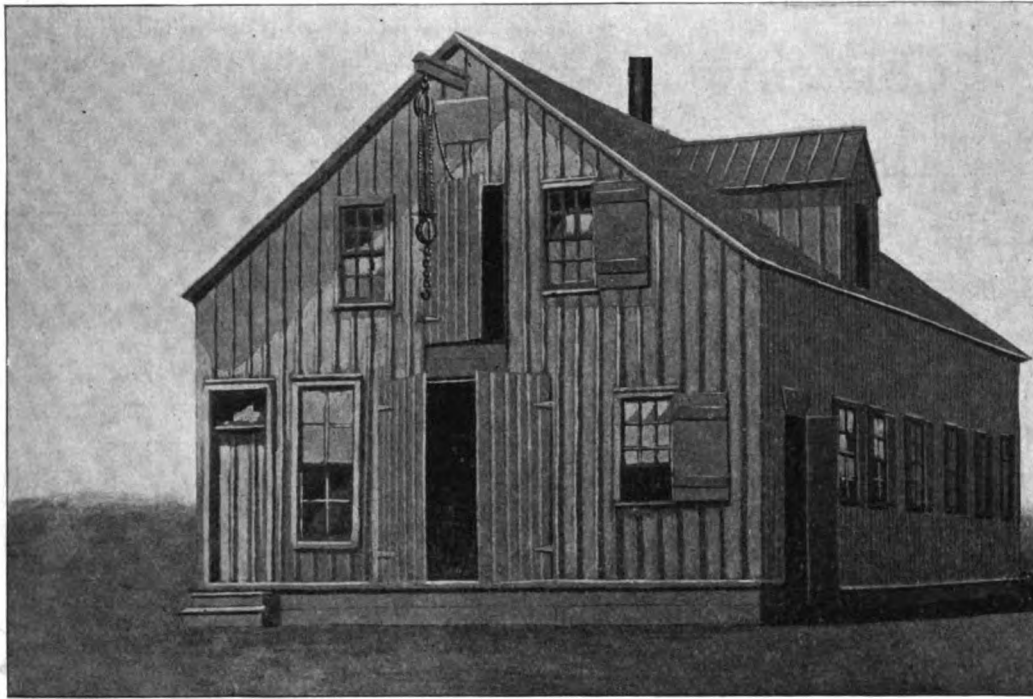
No. 4 A Double-Jet Torch, each, \$4.50.

THE TURNER BRASS WORKS,

63 No. Franklin St., CHICAGO.

TERMS:
Cash with
Order
or
C.O.D.

Twenty-Five Years' Progress



Buffalo Forge Company's Factory in 1878

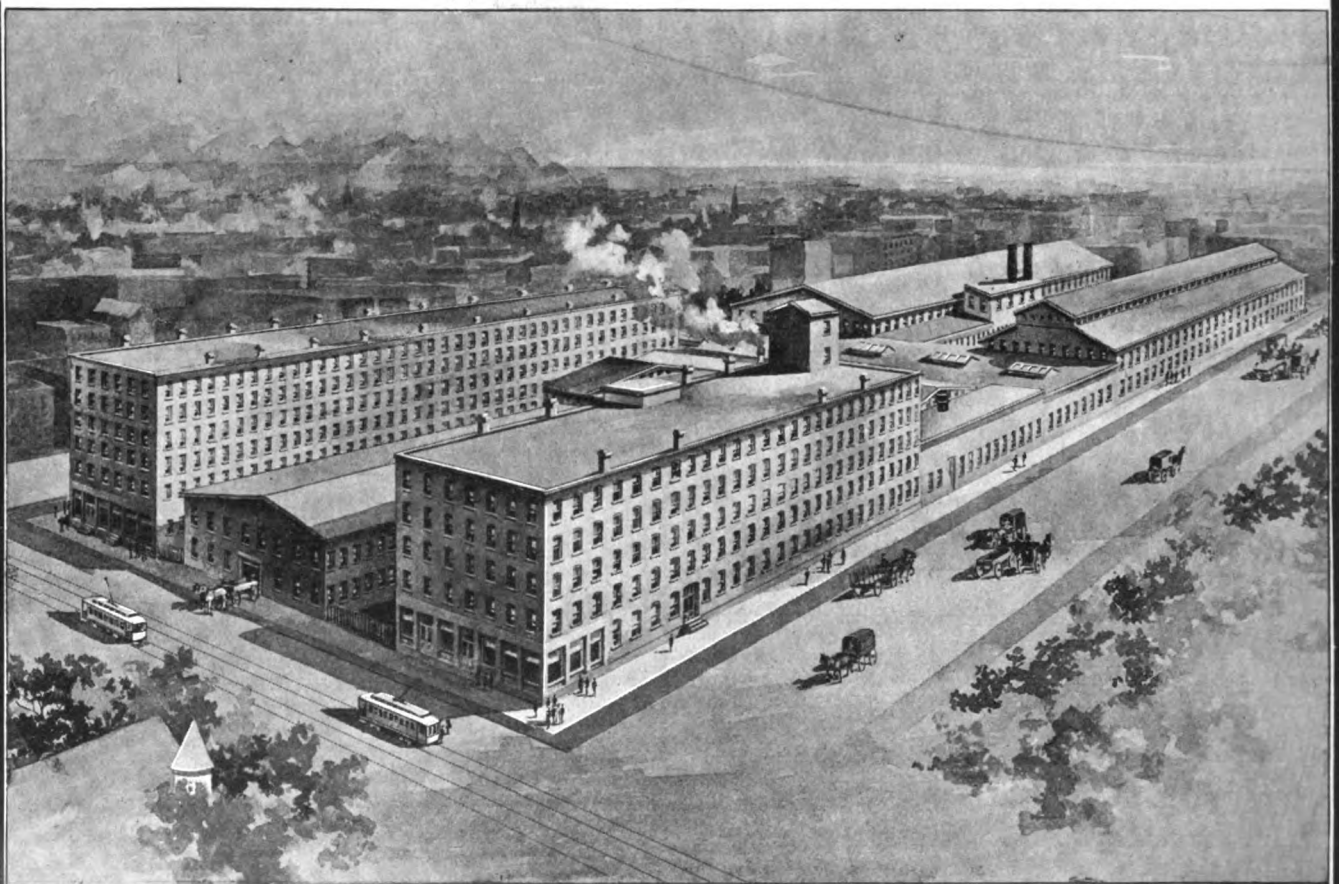
in Building
**BUFFALO
 FORGES,
 BLOWERS and
 BLACKSMITH
 TOOLS**

One quarter of a century ago this little frame factory was our home. Today we own and occupy the entire block of buildings shown below. Every inch of space is crowded and we are compelled to buy more land and build more buildings.

Why?
 Because the price is always right, the quality is always right, and the treatment of our customers is always right.

These works to-day turn out more machines than all competing manufacturers combined

Twenty-Five Years Ago and Today



Buffalo Forge Company's Factory in 1903

BUFFALO HAND BLOWERS

Most Improved and Powerful Hand Blowers Made.

RUNS IN OIL

Your Dealer will Send One on Trial if Desired.

ASK HIM

**-ONLY-
4
GEARS**

READ THE VERDICT!

J. R. HUNZINGER.

General
Blacksmithing

Repairing of
All Kinds
Promptly Done

Practical
Horse Shoeing

Olathe, Kansas.

DEC 2nd 1902.

BUFFALO FORGE COMPANY, BUFFALO, N. Y.

GENTLEMEN:

I have your hand blower up and have tried it two weeks. Am perfectly satisfied with the blower, and enclosed please find an order and draft for the second one. I have tried several different kinds of blowers and find your No. 99 hand blower superior to them all. I tried the XXX, the XXXXX, the XXXXXXX, the XXXXX, the XX, the XXX, the XXXX, the XXX, the XXXXX and the Old Reliable XXXX, that sucks ashes and cinders when it happens to be turned backward by accident or by a stranger. I will guarantee yours not to do this, as it works either way better than any of them in every respect, and recommend the Buffalo Blower to any blacksmith of any class that needs a good blower.

*Yours Respectfully
J. R. Hunzinger.*

P. S.—I have had 35 years of experience.

Box 508.

Write for
Latest Catalogue,
Just Out,

**SIMPLE!
COMPACT!
DURABLE!
EFFICIENT!**

**Air Blast
Strong and
Uniform.**

**Action
Smooth.**

**Operation
Easy.**

**No Lost
Motion.**

BUFFALO BLOWER No. 99.

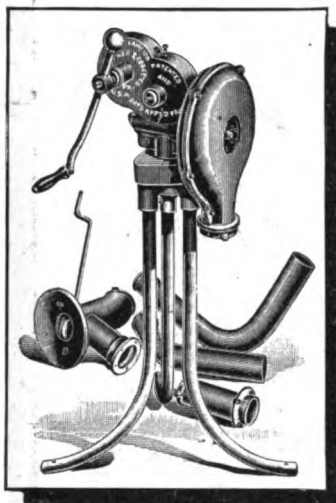
Buffalo Forge Company

BUFFALO, N. Y.

UNION HARDWARE

and **METAL CO.**

Los Angeles, California.



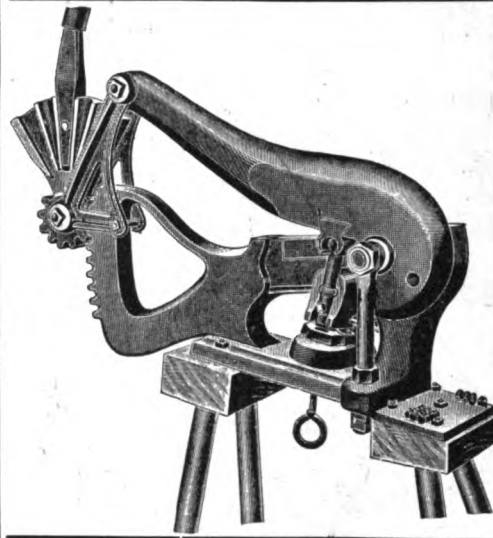
IMPORTERS AND
JOBBER OF
**HARDWARE, IRON
STEEL and COAL.
BLACKSMITHS, RAILROAD,
MILL and FOUNDRY
SUPPLIES.
WAGON HARDWARE
and WOOD STOCK.**

Also the great No. 400 line
of **Champion Steel Blowers
and Steel Forges**, which
in our experience with the
many we have sold, have
given absolute satisfaction.

They advertise themselves, one Blacksmith recommend-
ing them to another. They have and are replacing all other
makes of Blowers and Forges.

BE UP-TO-DATE

Attention, Blacksmiths!



The Sears
Blacksmiths
Device Guar-
anteed satis-
factory free
from every ob-
jection, with
points of excel-
lence found in
no other ma-
chine on the
market. Will
last a life time
with proper
care. It only
requires one
man to operate
this machine.

In using it
the operator
stands in front
of the device
and can with
ease handle the
machine with

one hand, leaving the other hand free to place the work before
cutting or punching same.

DESCRIPTION.

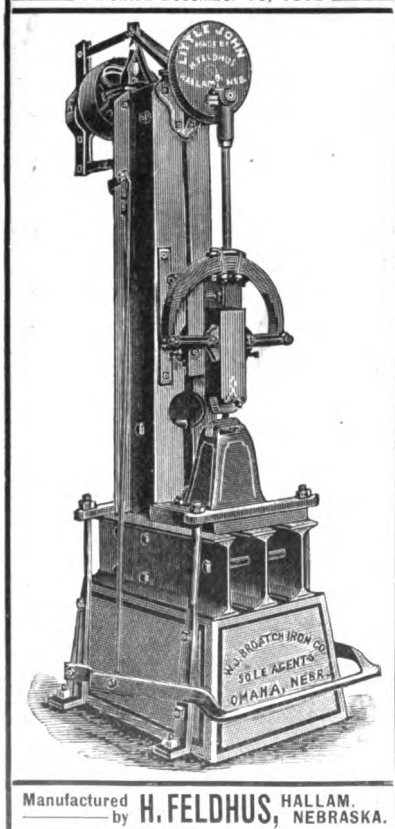
It will shear $3 \times \frac{3}{4}$, $4 \times \frac{5}{8}$, $5 \times \frac{1}{2}$ -inch cold iron, and will also
trim plow points, etc. It will cut any size bolt or bar up to $\frac{3}{4}$
inch. It will punch $\frac{1}{2}$ -inch holes in $\frac{1}{4}$ -inch iron and is provided
with the following size punches, $\frac{3}{16}$, $\frac{1}{4}$, $\frac{5}{16}$, $\frac{3}{8}$, $\frac{7}{8}$, $\frac{1}{2}$, and these
are furnished with each machine.

For sale by all jobbers. Send for catalogue.

GEO. SEARS & CO.,
CLINTON IOWA.

The "LITTLE JOHN" POWER HAMMER

Patented December 16, 1902



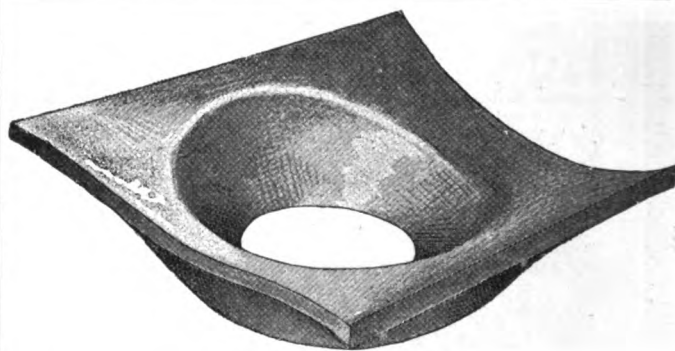
THIS Hammer is made
expressly for the
blacksmith, and is placed
at the low price of
\$90.00.

THE FRAME is built
of steel beams. It
cannot break, come apart,
or spring out of shape;
it is strong and solid, as
may be seen at a glance.

**W. J. BROATCH
IRON CO.**

SOLE AGENTS.

**Omaha,
Nebraska.**



CI-CO FIRE POT.

Keeps Fire Compact and Clean.

Saves Fuel and Time.

Fits any Ordinary Tuyere Iron.

Size $15 \times 13 - 4\frac{1}{2}$ deep.

Weight, 75 lbs. Price, \$3.00 each.

LIBERAL DISCOUNT TO DEALERS.

CAMPBELL IRON CO.

Dealers in

Iron and Steel

**Blacksmiths
and Wagonmakers' Material.**

Headquarters for
HORSESHOERS' SUPPLIES.

ST. LOUIS, MO.

Manufactured by **H. FELDTHUS, HALLAM, NEBRASKA.**

SARVEN - WOODHUB - WARNER*Second Growth*

Hickory Spokes,
Oak and Hickory Rims
Elm Hubs,

Write for Prices.

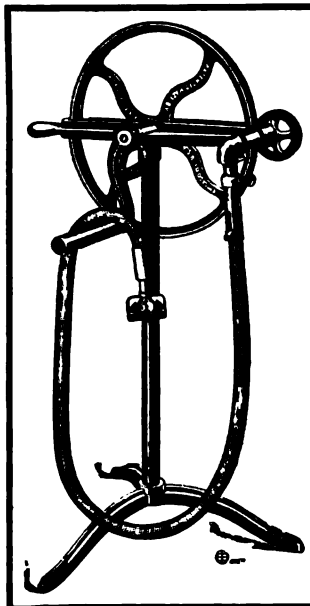
v v v

The Ohio 
Wheel Co.

DELPHOS, O.

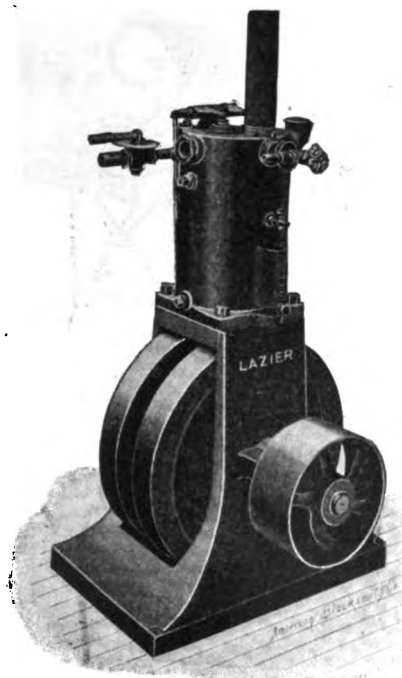
ALL OVER THE WORLD

The 1902 Chicago Clipper

Price, \$10.75.

"Stewart's Patent" is recognized as the greatest clipping machine ever invented. More of them are sold every day ten times over than all other makes combined. Each one is sold under a positive guarantee to clip faster and turn easier than any other made, regardless of price, or money refunded. Remember that the gearing of the 1902 Chicago Clipper is all cut from solid metal, not cast. Unlike any other machine made, it can be turned with either the right or left hand. This is the machine that received the highest award at the Pan-American Exposition, and is used by professional clippers all over the world, to the exclusion of all others. Send \$3.00 and machine will be sent C. O. D. for the balance. Send to-day for beautifully illustrated catalogue, showing everything modern in this line.

CHICAGO FLEXIBLE SHAFT CO., 120 LA SALLE AVENUE,
 CHICAGO, ILLINOIS.
 New York Office, 97 Chambers St. London Office, 22 Denman St., S. E.

JUST THE THING FOR A BLACKSMITH

Our $8\frac{1}{2}$ H. P. vertical straight line engine is the most simple and up-to-date machine that has ever been placed on the market. It is guaranteed to develop $8\frac{1}{2}$ H. P. and will develop 5. It is shipped for either gas or gasoline complete at \$115 cash, or \$145 on time. This machine is sold without agents direct to the customer, giving him every benefit.

Three hundred engines in operation in Buffalo alone.

Highest award at Pan-American Exposition, Amsterdam, Holland, and at Lille, France.

If you need power we can do business with you.

Send for details, and please mention the American Blacksmith.

We build engines up to 100 H. P.

Lazier Gas Engine Company,

585-587-591-593 ELLICOTT SQUARE, BUFFALO, N. Y.

Phineas Jones & Co.*of NEWARK, N. J.***make Vehicle Wheels all kinds***THEIR SLOGAN (WAR CRY) IS***"BEST ON EARTH."**

x x

If you have never used

Jones' Standard Wheels

TRY THEM.

x x

ALL GRADES.
BEST CHEAP GRADES.
CHEAP BEST GRADES.

x x

R. S. V. P.

THE RED BOOK

Our Catalogue for 1903 is Ready

SEND
FOR
IT
NOW

Every Blacksmith, Farrier, Carriage Builder, and Wagon Maker in the country who is a good business man—who believes in getting the best goods he can for the least money should send for our catalogue now. It will cost you just one cent for a postal card and will save you ten cents on every dollar's worth of stock you buy in 1903. It is handsome and complete and should be in every shop in the country. When you get our catalogue you will wonder how we can sell so much cheaper than other houses. After you have sent in your first order and received your goods you will wonder how we can sell so much better material than "the other fellows" and make shipments so much more promptly. If you want to find out, sit down now and send for . . . "THE RED BOOK." . . .

SEND
FOR
IT
NOW

HERE'S THE WAY OUR OLD CUSTOMERS WRITE—"STRAWS SHOW WHICH WAY THE WIND BLOWS"—

KOKOMO, IND., Dec. 22, 1902.

GENTLEMEN: Send me your red book for 1903 as soon as possible. I found the prices in your 1902 catalogue were from 5 to 10 per cent. less than other houses were charging and I don't believe in paying any more for my goods than I have to.

Yours truly,

.....
Name on application.

KINGSTON, N. Y., Dec. 24, 1902.

GENTLEMEN: Please send me at once your 1903 catalogue which you call the Red Book. It was a red letter day for me when I got your last year's catalogue because it has saved me money on every order.

Yours very truly,

.....
Name on application.

KIRKSVILLE, Mo., Dec. 27, 1902.

GENTLEMEN: Please mail me your 1903 catalogue. I like your way of doing business and your prices are lower than I can get from any other firm. I enclose a small order. Please ship promptly and oblige.

Yours truly,

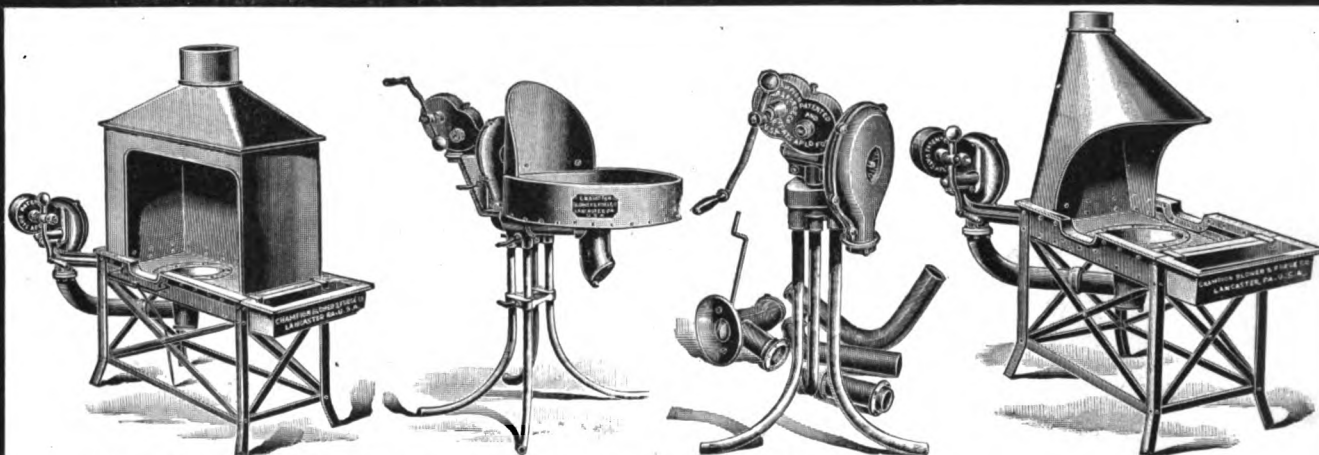
.....
Name on application.

WE WOULDN'T GET LETTERS LIKE THESE IF THERE WASN'T SOME REASON FOR IT.

FORT WAYNE IRON STORE CO.

1117 Calhoun Street

FORT WAYNE, IND.



"The above Tools are the best sellers we have ever handled."

If you are looking for an "up-to-date" Blower or Forge, we can recommend (without question) the No. 400 Forges and Blowers.

We also carry a complete stock of Blacksmiths' and Horseshoers' Tools and Supplies. Prices quoted upon application.

Uptown Branch:
232 E. 125th ST.

Telephone
Connection

VOUGHT & WILLIAMS

363, 365 and 367 Greenwich St.

Between Franklin and Harrison Streets

NEW YORK CITY

IRON, STEEL
AND
BLACKSMITHS'
SUPPLIES

All Coons Look Alike..

SO DO THE PICTURES OF GAS ENGINES,
WE DON'T SHOW ANY CUT, BUT WE HAVE THE

BULL DOG

Shawd's Gas and Gasoline Engines.

THEY NEVER LET GO. HAVE THE GRIP ON THE TRADE. DON'T COMPETE IN EITHER PRICE OR QUALITY WITH THE MANY CHEAP ENGINES NOW ON THE MARKET. AN HONEST ENGINE AT AN HONEST PRICE. MADE IN 2 H.P., 4 H.P., 6 H.P. SIZES. WITH OR WITHOUT PUMPING JACK. LIBERAL DISCOUNT to DEALERS and JOBBERS.

ADDRESS _____

THE SHAWD GAS ENGINE CO., Springfield, Ohio.

BEGIN THE NEW YEAR RIGHT

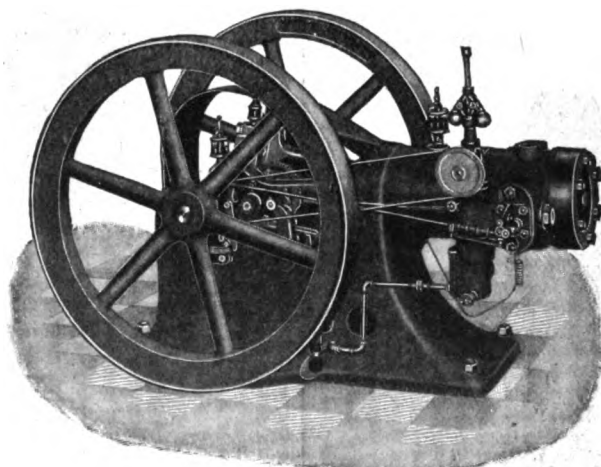
BY PLACING
YOUR ORDER FOR
ONE OF OUR

„GAS or GASOLINE ENGINES

x

Acknowledged to
BE THE BEST
in the
MARKET.

x



x

For.....
SIMPLICITY
and
DURABILITY
they're
Unsurpassed.

x

USES A MAGNETO GEARED DIRECT TO THE ENGINE.

SEND FOR OUR CATALOGUE. IT WILL INTEREST YOU.

NO BATTERIES. HOT TUBES.

The FRANK M. WATKINS MANUFACTURING CO.

537 BAYMILLER STREET,

CINCINNATI, OHIO.



VITRIFIED WHEELS

WILL NOT BURN OR DRAW TEMPER FROM YOUR TOOLS, WILL
CONTINUE TO BE FREE CUTTING AND WILL NOT BECOME GLAZED
THERE IS NO METAL THAT OUR WHEELS WILL NOT CUT

OUR GRINDING MACHINES ARE MADE IN DIFFERENT SIZES AND STYLES

WRITE US YOUR
REQUIREMENTS

Vitrified Emery Wheel Co.

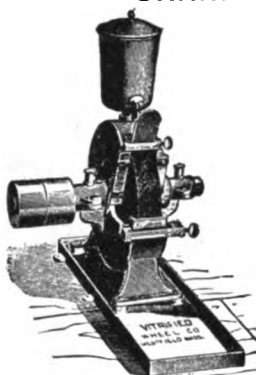
WESTFIELD
MASS.

Save Files! Save Time! Increase Profits!

BY USING

EMERY AND CORUNDUM WHEELS

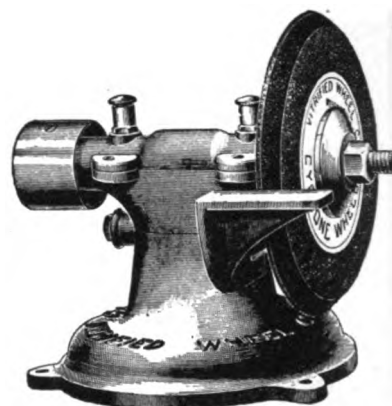
FOR GRINDING AND SHAPING YOUR WORK
SHARPENING TOOLS, ETC.



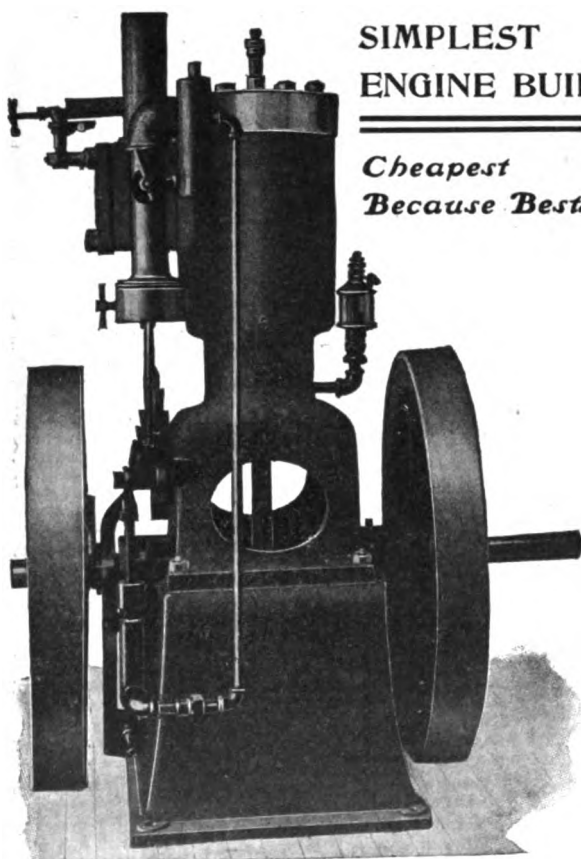
Bench Water Tool Grinder

Will Pay for Themselves

MANY TIMES OVER IN DOING
YOUR CUSTOM GRINDING



Handy Grinder



**SIMPLEST
ENGINE BUILT.**

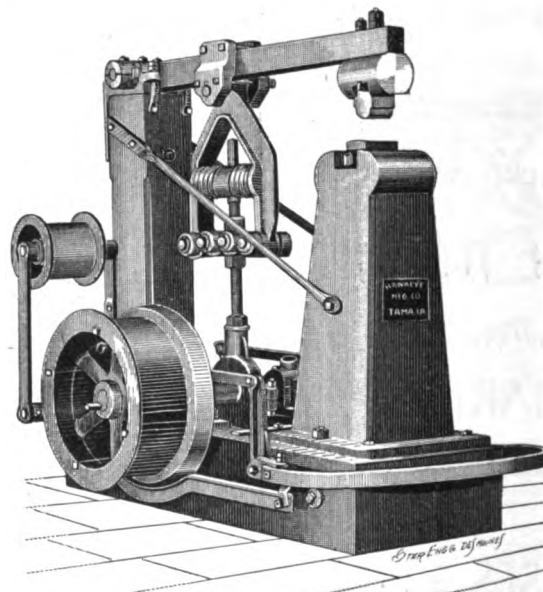
*Cheapest
Because Best.*

DAVIS Horizontal and Upright Gasoline Engines
Used in every state and territory. Catalogue
free. Write today.

CASCADEN MFG. CO., WATERLOO, IOWA.

The Hawkeye Power Hammer

is guaranteed to be the handiest and most powerful power
hammer on the market for the price at which it is sold. It will
strike as light as you like, and heavy enough to successfully work
iron three inches in diameter, and is highly recommended by
blacksmiths for plow and general repair work.



Write for prices and circular which shows our new design
and gives full particulars of our new 1903 hammer.

Address
... the

**Hawkeye Manufacturing Co., TAMA,
IOWA.**

WATCH FOR NEW CUT NEXT MONTH.

American Blacksmith Premiums

Free, Postage Prepaid, to New Subscribers or Persons Securing New Subscribers

Among the mighty army of blacksmithing craftsmen, there are many who are not familiar with THE AMERICAN BLACKSMITH. Our premium offer is to induce all who do not know the journal to read it for one year. This will convince them that it is worth a great deal more than the subscription price.

WE GUARANTEE subscribers twenty pages of solid reading matter each month. The foremost craft authorities are regular contributors. No trade puffs, funny stories, stale clippings. Two hundred and forty pages every year of the best craft literature, handsomely illustrated not counting the ad. pages. Columns always open for questions or letters. Isn't this a great big dollar's worth?

Every new subscriber sending us one dollar will receive THE AMERICAN BLACKSMITH for one year, a copy of the premium picture, "The Village Smithy," and any one single subscription premium offered below.

If you can get any other person or persons to subscribe, at one dollar each, you will be entitled to a choice of the premiums corresponding to the number of subscribers secured. They get the paper and "The Village Smithy." You get the premium. Back numbers with fuller description of our premium offers sent on request. All premiums are strictly as described.

You do not have to be a subscriber yourself to get a premium for raising such a club of subscribers. If you are not a subscriber you may include your own name in the club. We will give you cash commissions instead of premiums, if desired. Write for particulars.



Handy Bench Level.

We offer a handsome and reliable little bench level, $8\frac{1}{4}$ inches long. Blacksmiths and carriage men will find use for it every day.

FREE FOR ONE NEW SUBSCRIPTION.

Horseshoers' Rasp.

We offer one of the best horseshoers' rasps made, sixteen inches long. The metal is special refined crucible cast steel, and is properly hardened and tempered.

SENT FOR TWO NEW SUBSCRIPTIONS.



Farriers' Hoof Knife.

This knife is made of special refined crucible steel carefully tempered. The manufacturers state that it is their very best product. **FREE FOR ONE NEW SUBSCRIPTION.**

Blacksmiths' Steel Folding Rule.

By special arrangement we offer a two-foot rule, $\frac{3}{4}$ of an inch wide, made of the best quality of spring tempered steel. This is a single-joint double-arm rule, graduated in eighths of an inch. **SENT FOR TWO NEW SUBSCRIPTIONS.**



Gold Fountain Pen.

The fountain pen shown full size here is made of the best hardened Para rubber, having a 14-kt. gold point, fitted with the best iridium tips, carefully ground. Ink will not corrode it. The feed is very simple with no parts to get out of order. Writes the moment the pen touches the paper. Well-made and serviceable. Each pen tested before sent out. **FREE FOR TWO NEW SUBSCRIPTIONS.**

Solid Frame Hack Saws.

This hack saw has a solid steel frame, giving a very stiff saw which cannot be cramped by straining up the blade. The saw may be set to cut in either of four directions and tightened by simply turning the handle. It is well made in every respect. We offer an eight-inch saw complete with one blade.

SENT FOR THREE NEW SUBSCRIPTIONS.

Blacksmiths' Aprons.

These aprons are made of the best quality of raw-hide, size 26 by 34 inches. They are correct in shape and are provided with long leather strings of ample length for tying.

FREE FOR FIVE NEW SUBSCRIPTIONS.



The Electric Diamond Grinder.

The stone used in this grinder is genuine carborundum. The chain and gearing arrangement gives high velocity to the wheel. This is therefore a rapid cutting, highly-serviceable machine. Each grinder is furnished with a buffing wheel.

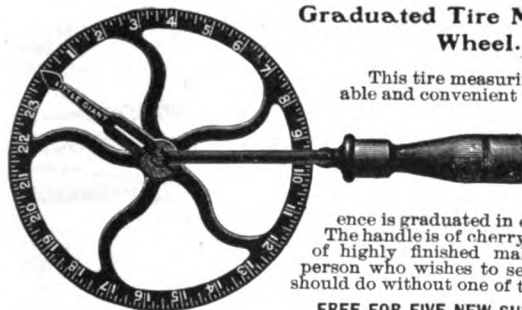
FREE FOR EIGHT NEW SUBSCRIPTIONS.

Hack Saw Blades.

We make two offers of hack saw blades, of the finest quality of steel. The teeth are carefully set and tempered by an improved process, which leaves them hard and tough. The set assures a free, smooth cut and gives a very rapid cutting saw. We will furnish any size of saw up to twelve inches. **SIX BLADES SENT PREPAID FOR TWO NEW SUBSCRIPTIONS. ONE DOZEN BLADES FREE FOR THREE NEW SUBSCRIPTIONS.**

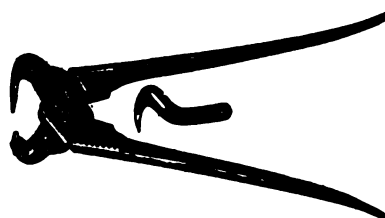
Five new subscriptions gives you the hack saw and 7 blades. Six new subscriptions gives you the hack saw and 18 blades.

Graduated Tire Measuring Wheel.



This tire measuring wheel is a durable and convenient one. The point is held in place by friction and can be set instantly. It is light, strong and accurately made. The circumference is graduated in eighths of an inch. The handle is of cherry. All other parts of highly finished malleable iron. No person who wishes to set tires accurately should do without one of these wheels.

FREE FOR FIVE NEW SUBSCRIPTIONS.



Giant Hoof Parer.

Claimed by its makers to be superior to any other tool of its kind on the market. Weighs less than two pounds and makes a perfectly straight cut. A powerful and serviceable implement.

SENT FREE FOR EIGHT NEW SUBSCRIPTIONS.

Subscription Price: United States and Canada, \$1.00 per year, in advance; Foreign Countries, \$1.25. Sample Copy Free NO PREMIUMS GIVEN FOR RENEWALS OR SUBSCRIPTIONS FOR LESS THAN A YEAR.

SPECIAL

A cash Prize of TEN DOLLARS will be given to the person sending in the largest club of subscribers between now and April 1, 1903. In case two or more persons send in the same number of subscriptions the prize money will be divided equally among them.

SEND MONEY BY POSTAL ORDER, EXPRESS ORDER, REGISTERED LETTER OR STAMPS. DO NOT SEND CHECKS

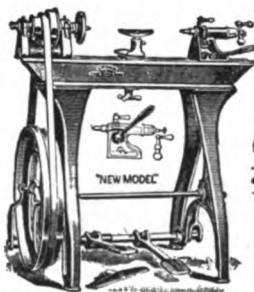
American Blacksmith Company, P. O. Drawer 974, BUFFALO, N.Y., U.S.A.

Wood-Working ^{Foot and Hand Power} Machinery

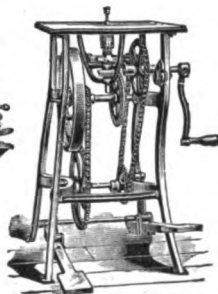
COMPLETE OUTFITS

Wagon-builders, Carpenters, Cabinet-Makers, and all workers of wood can successfully compete with the large shops by using our labor-saving machines. They are even used in shops having motor power.

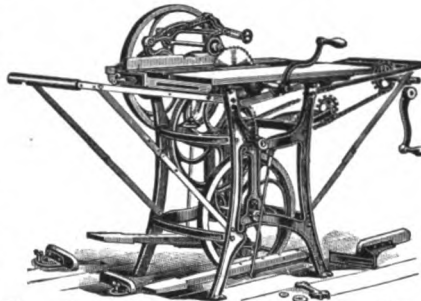
Machines Sent on Trial



"Crown" Lathe.



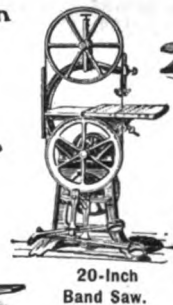
"Rex" Molder.



No. 5 "Union" Combination Self-Feed Rip and Cross-Cut Saw.



"Victor" Scroll Saw.



20-Inch Band Saw.



"Diamond" Mortiser.

Send for
Catalogue "A."

Considering the quality and quantity of work our machines will do, they are the cheapest machines made. They are built for hard work, accurate work, and long service.

THE SENECA FALLS MFG. CO. 274 WATER STREET
Seneca Falls, N. Y., U. S. A.

The "EASY" and "NEW EASY" BOLT CLIPPERS.

It is a saying as old as the everlasting hills that the "proof of the pudding is in the eating." If this is so, the test of a tool is in the use of it, and the test of its merit must be its popularity. No other BOLT CLIPPERS have ever had so large a sale as these, and their sale is not confined to this country, but is world-wide. These are facts, and on these facts is based the claim,

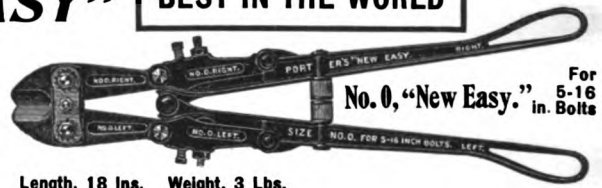
Best In The World.

CAUTION. An inferior imitation and infringement of the "EASY" BOLT CLIPPER, resembling it in appearance, but not in quality or workmanship, is being made, and is sold in a small way by some catalogue houses and department stores. **DO NOT BE DECEIVED**, but insist on having these tools with Porter's "EASY" or "NEW EASY" BOLT CLIPPER on the handles. They are the only genuine tools, and they are sold by all legitimate dealers in carriage and heavy hardware in the United States and Canada.

Send For Circular.

H. K. PORTER,
Everett Station,
BOSTON, - - - MASS.

BEST IN THE WORLD



No. 0, "New Easy." For 5-16 in. Bolts

Length, 18 ins. Weight, 3 Lbs.



No. 1, "EASY." For 3-8 in. Bolts

Length, 24 ins. Weight, 4 1-4 Lbs.



No. 2, "EASY." For 1-2 in. Bolts

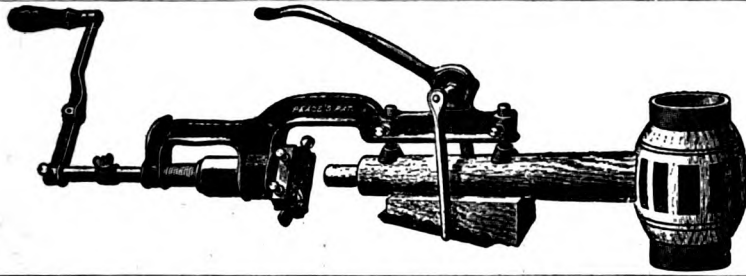
Length, 30 ins. Weight, 7 1-2 Lbs.



No. 3, "NEW EASY." For 5-8 in. Bolts

Length, 36 ins. Weight, 12 1-2 Lbs.

PEACE'S IMPROVED-SPOKE TENONING MACHINE



Every machine warranted. No need of using a spoke trimmer, as the knife starts on the blunt end of the spoke and centers perfectly. The chuck, to hold bit for felloe boring, is adjusted without removing the cutter head. The auger is kept cutting by force of a spring. Anyone can work it; is adapted to any size spoke or dish of wheel; is readily applied without moving wheel from where spokes are driven; is easily clamped to the spoke in a second's time, so as to hold it steadily while boring, and is as quickly detached. Cuts every tenon perfectly true, cutting from $\frac{1}{4}$ to $1\frac{1}{4}$ inch.

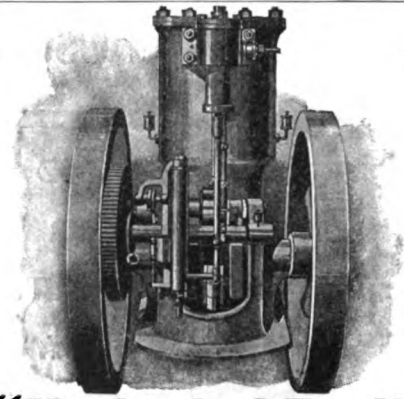
Price, Net Cash, - - - - - \$8.50
Price, with Felloe Boring Attachment, Net Cash, 9.50

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DEALERS in Iron, Steel, Wagon and Carriage Materials and Tools of all kinds.
MANUFACTURERS of Iron and Steel Roofing and Building Material.
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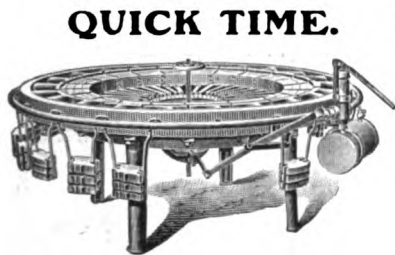


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Means no trouble to **start**, no trouble to **run** and **full power** in **all kinds of weather**. The latest improved and most wonderful Gasoline Engine built. **Prices?** Well, just cut this out and write us before you buy. We have the best engine and we will make the best prices to Blacksmiths and Wheelwrights. $2\frac{1}{2}$ to 40 H. P., all styles.

Prouty Gasoline Locomotive Co.
Lansing, Mich.

The Hercules Hydraulic Tire Setter.



QUICK TIME.

Hand or Power, for Repairer or Manufacturer

It will set
A TIRE PER MINUTE

by hand.

A sixteen-year-old boy can work it. Write for Circulars and Prices.

PERFECT WORK.

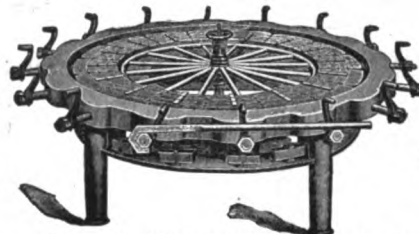
NATIONAL MACHINE CO. KEOKUK, IOWA.

When you buy a Hand Power Tire Setter

get the best one made.

It is the **Henderson**

700 have been made and sold



The first and last practical hand power tire setter

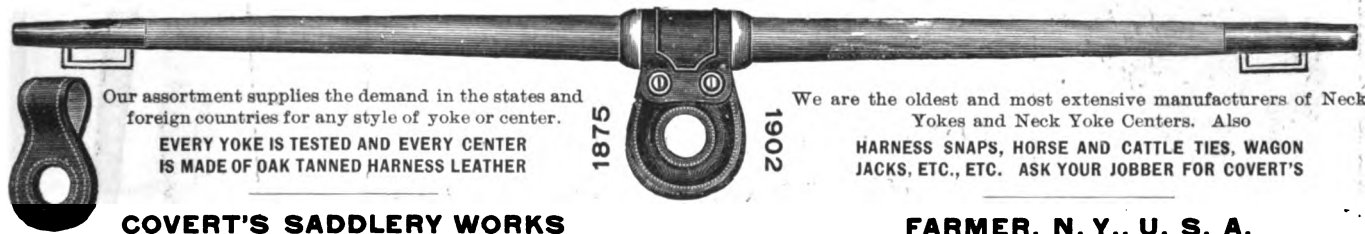
It sets tires cold, keeps the dish just right and puts a wheel in the best possible condition. It tightens spokes in hub and rim and all joints.

Write for Circulars, Prices and Terms.

STANDARD TIRE SETTER CO.

KEOKUK, IOWA.

THE WOODS is full of CHEAP NECK YOKES and NECK YOKE CENTERS, but when a manufacturer wants a good, safe yoke for his own use, he always buys COVERT'S. You should insist upon it and accept no other.



Our assortment supplies the demand in the states and foreign countries for any style of yoke or center.

EVERY YOKE IS TESTED AND EVERY CENTER IS MADE OF OAK TANNED HARNESS LEATHER

COVERT'S SADDLERY WORKS

We are the oldest and most extensive manufacturers of Neck Yokes and Neck Yoke Centers. Also

HARNESS SNAPS, HORSE AND CATTLE TIES, WAGON JACKS, ETC., ETC. ASK YOUR JOBBER FOR COVERT'S

FARMER, N. Y., U. S. A.

Blacksmiths, Attention! Our 1903 net Price Catalogue is Now Ready for the Mails.

This Catalogue contains everything used by Blacksmiths, Wagon Makers, Horseshoers, etc. With lowest net prices ever offered to the trade. Will mail free upon request. Write at once. X

The EDMUND H. COOMBS CO., Fort Wayne, Indiana.

To the Apron User.



**GOOD
FOR
JANUARY
ONLY.**

There are 200,000 leather apron users in the United States and Canada, one half of whom are wearing "The Boss Apron" to-day, and for the purpose of introducing same to the other 100,000 I make the following offer:

Upon receipt of order accompanied with either New York Draft, Express or Post-Office Money Order I will send, EXPRESS CHARGES PREPAID,

One Boss Apron, size X, 30 x 36 inches, for \$1.50.

One " " " A, 26 x 33 " " 1.25.

One " " " B, 24 x 30 " " 1.00.

This apron is made of Bark tanned split leather, with Brass eyelets, and leather strings, and will outwear three sheepskin aprons. Its constantly increasing sales during the past four years proves its superiority, and it has the endorsement of many of the best Master and Journeymen shoers in the country, as the letters on file in my office will show.

If not satisfied upon receipt of Apron, return same and I will refund your money.

This offer is good only for the month of January.

ADDRESS Edmund C. Beckmann,

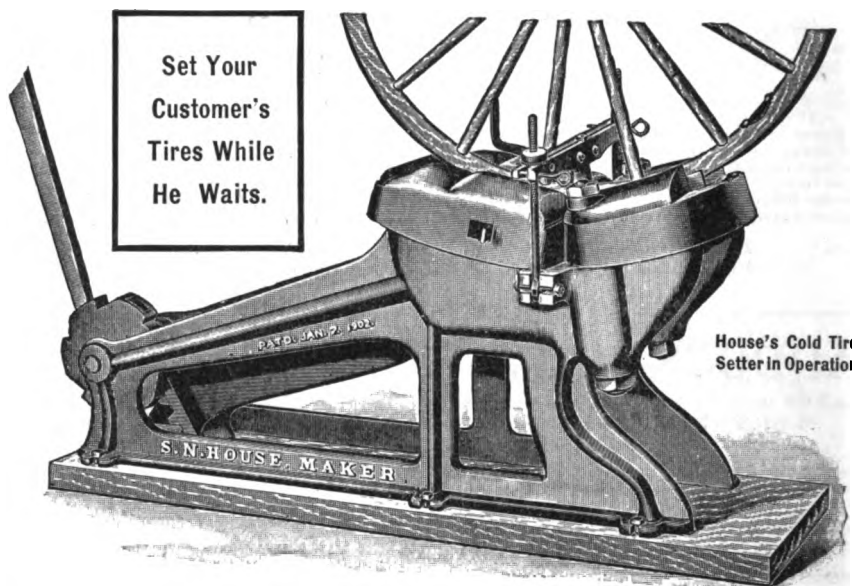
712 N. 4th Street, St. Louis, Mo., U.S.A.

N. B. Money must accompany order to receive attention.

Mention this Journal when writing.

The Tire Setting Problem Solved

ONE MAN CAN OPERATE IT. You can't afford to lose an hour taking off a tire and setting it the old way, for you can do it better with this machine in five minutes and save your fuel and bolts. It does not injure the tire nor woodwork, for it simply grips the tire on the edges in two places close together and shrinks it in a two or three-inch space, cold, just as we have been doing for years after they had been taken off and heated. The grip keys are eight inches long, so they can't scar nor cup the tire. The wheel is screwed down firm against the machine so that the tire can't kink while setting. It sets them quickly and nicely, and it is the only machine that does. It is as simple and easily operated as the hot tire setters, made on the same principle, and will last forever. It is made of steel and cannot be broken; it weighs seven hundred pounds. Write at once for descriptive circular and price, which is very reasonable. It is for sale by nearly all the leading hardware dealers.



IT IS MANUFACTURED BY

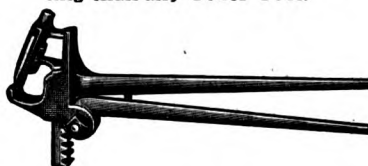
S. N. HOUSE, 2216 SCOTT AVENUE,
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No One Who Shoes Horses
Can Afford to be Without a

Bliss Hoof Cutter

IT IS the Most Powerful.
DOES the Largest Range of Work.
DOES the Best Work.
EASIEST Kept in Order.
MAKES Easier Work of Hoof Cutting than any Other Tool.



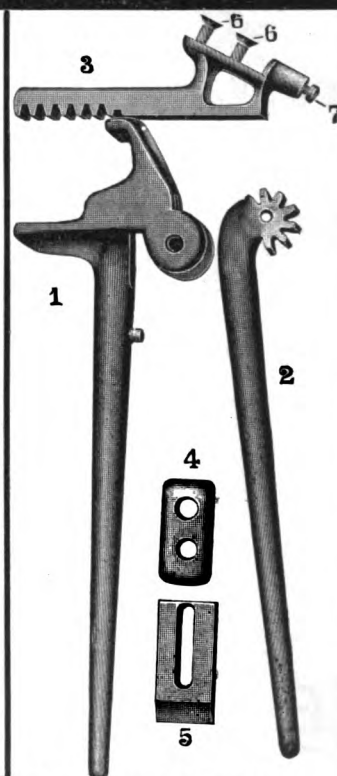
**THIS Tool is Fully Guaranteed
by THE MAKERS. Sent on Ten**

Days' Trial and may be returned if not satisfactory.

BLISS MANUFACTURING CO.

SOUTH EGREMONT, MASS.

SUCCESSOR TO W. L. BLISS.



TOOL TAKEN APART.

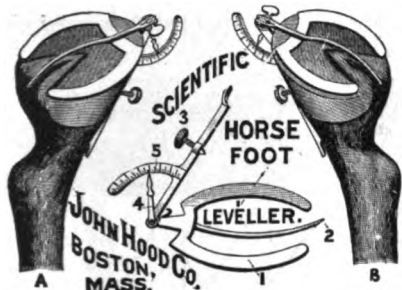
Part No. 1 is the main handle which is mortised to receive No. 2 and No. 3. The knife, No. 5, is secured by screws No. 6, 6, under washer No. 4. No. 7 is a screw which takes up the wear of the knife and keeps it in proper place.

Are there LAWN MOWERS in your section?

If so, you should grind them. With power and one of my grinders in your shop you could control the business in your section.

PRICES, \$75, \$150 and \$225

C. R. ZACHARIAS, Asbury Park, N. J.



IF INTERESTED IN LEVELLER

send for testimonials of Blacksmiths who have used it.

JOHN HOOD & CO.

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"GUS" GAS AND GASOLINE ENGINE

A MODEL OF PERFECTION



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Manufacturer of **Buggy Tops and Trimmings**

THE BEST TOP in the world for the least money. Write for Price List.

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EASY HOOF PARER...

No Malleable Iron in it. Cuts through any Horse Nail without injury.

Circulars on request.

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Price, \$2.15 Each. SHOEENERSVILLE, PA.

The National Self-Oiling Steel Tubular Axle MAKES THE EASIEST RUNNING WAGON ON WHEELS.

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National Tubular Axle Co.

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To Sell a Valuable Horse

Advertise it in

THE HORSE WORLD

OF BUFFALO, N. Y.

Send for Rates.

Largest Circulation.

Plenty of Testimonials of Quik Results.



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A Watch Free

Every horseshoer has constant opportunity to examine horses and give advice about treatment for blemishes.

Any Blacksmith can make this advice profitable, can make good commission and can get an Ingersoll Watch as an additional premium, by saying a few good words about

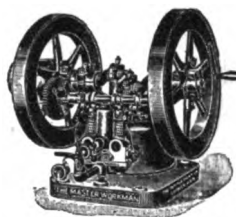
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Write at once for full particulars.

W. B. Eddy & Co. High St. Whitehall, N.Y.

AT LAST! A GASOLINE ENGINE

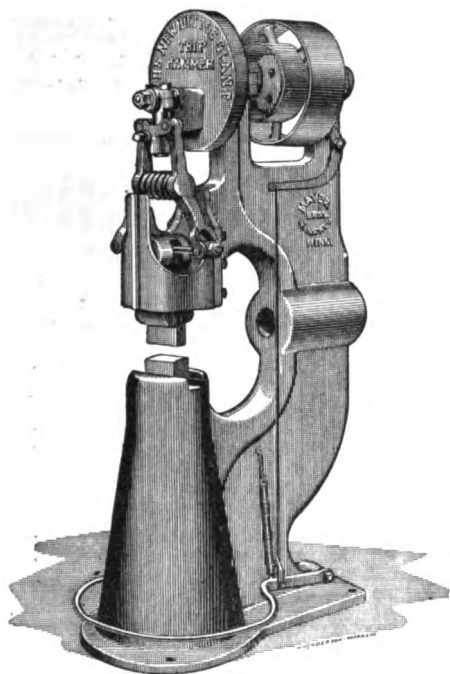
WHICH ANY ONE CAN RUN AND WHICH IS EFFECTING A REVOLUTION IN THE BUSINESS.



It is the "MASTER WORKMAN." An upright engine with two cylinders. Superior to any one-cylinder engine. It has no vibration and can work on a light wagon, or can be placed anywhere. All mechanism is in full view and all parts accessible. **STARTS EASIER** and quicker than any one-cylinder engine. **HAS MORE POWER**, consumes less fuel, occupies less space. 1½, 2, 2½, 4, 5, 6, 8, 10 and 15 Horse-power. Less complicated and has fewer parts than one-cylinder engines. This is the 48th year of its manufacture, and **THEIR GUARANTEE** is absolutely to be relied upon. Every engine is sold on honor.

AGENTS and BUYERS WANTED. Send for catalog. Mention this paper.

THE TEMPLE PUMP CO., 15th Place, CHICAGO, U.S.A. Mfrs. of the Celebrated Diamond Windmills; also full line of Pumps, including Well Purifying Pumps.



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U. S. PATENT, JANUARY 1, 1901
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550 NOW IN USE

TRIP HAMMERS

NOW IS THE TIME TO BUY

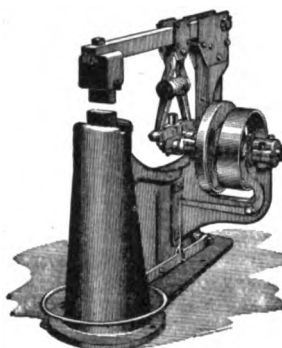
A TRIP-HAMMER

Is the Blacksmith's

BEST HELPER

And Will Pay for Itself

IN ONE YEAR



THE EASY
PATENT APPLIED FOR

50 NOW SOLD

For Prices and Information

Write to

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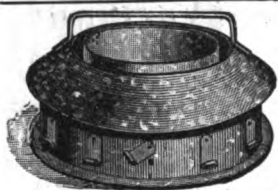
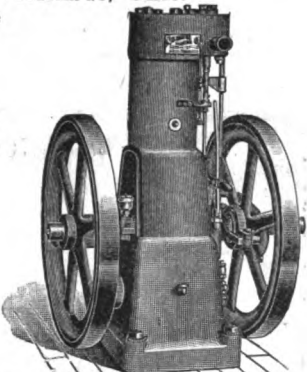
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**COLUMBUS GASOLINE
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Stating
Horse
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You
Need.



**DOWD'S
Tire Heater**

burns any kind of fuel.
Can be used in or out
doors. Holds up to 10
sets of tires at a time.
PRICE, ONLY \$15.
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THE
**"Sure Step"
Horse Shoe**

Consists of an iron body provided with a rubber tread.
Prevents stumbling, slipping and interfering.

**HOW TO FIT
THE SHOE** Take out rubber, heat shoe to a dull cherry
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slowly. Replace rubber, clinch well all around
inside of shoe, also two pegs at toe. This shoe can also be shaped cold, as
metal will give to widen or narrow same. Run in Regular Sizes, 1 to 7.

GET OUR PRICES
THE MOST REASONABLE, AS WELL AS MOST
DURABLE RUBBER SHOE ON THE MARKET

MANUFACTURED BY
THE HAHN MANUFACTURING CO.
Be Sure and Send for Free 360-362 GRAND ST.
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THE ONLY
RUBBER
HORSE SHOE
THAT CAN BE
FITTED HOT

Hand Forged Butcher Knives

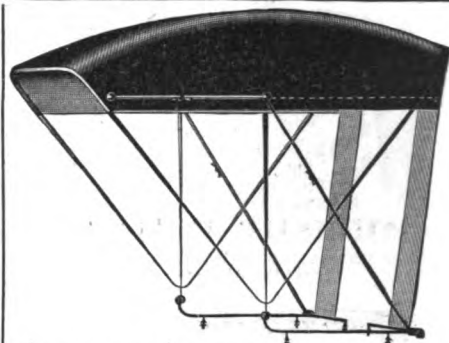
Ground, Tempered and all ready for the handles, either round or riveted, for *15 cents each or \$1.50 a dozen*. All sizes from 5-inch to 8-inch. These Blades are made from Sanderson Steel and *warranted*. Will replace any imperfect knife with two new ones. Handles all ready to put on, *one cent each*.
Try a sample. *Hundreds of 'Smiths are using these blades and make money and friends selling them. Liberal discount in quantities. Address*

WOODWORTH KNIFE WORKS, - NUNDA, N. Y.
ESTABLISHED IN 1876.

**Plow Lay
Welding
Machine
and
Leveling
Block
Combined**



An invention to provide a novel, simple, efficient and economical method of welding and shaping all kinds of plow shares. Indispensable to Every Blacksmith. Guaranteed to Give Satisfaction. If not satisfactory, money refunded. Send for illustrated circular and prices. It tells the rest.
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West Eighth St., - CINCINNATI, O.

Stallion Owners!

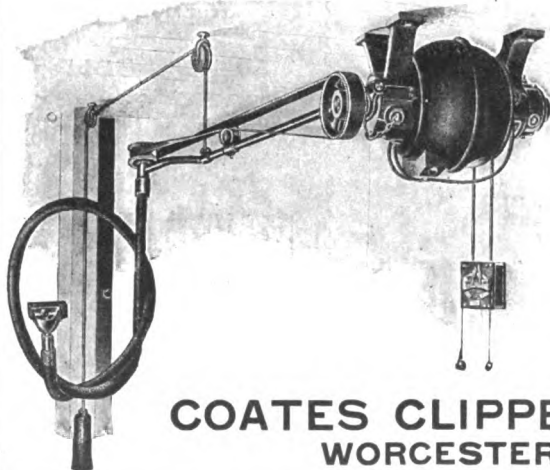
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COATES CLIPPERS



**Clip Your Horses
Groom Your Horses
Drill Holes**

*In handy or unhandy places
QUICK*

All with the same machine.

*A machine that can be used every
day in the year.*

*The new head throws six teeth;
all other heads throw only
two or three teeth.*

*It works easier, clips twice as
fast.*

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WORCESTER, MASS.

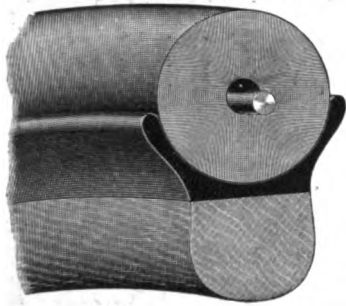
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can have, on application to us, a pound sample box of our "C" brand Horse Shoe Nails sent to any address in Canada, free of charge.

We want you to submit them to the most exacting tests. You will find they stand the hardest usage and hold the shoe on longest. They are the easiest to drive by reason of their faultless pattern and hardened points. They are "hot forged" from Swedish Charcoal Steel Nail Rods, which is the best material known or used in the world for making Horse Nails. Every Nail is carefully inspected and guaranteed perfect.

If our sample Nails please you, kindly ask the hardware merchant who supplies you to furnish you with them only. Our name and trade mark (the Gothic letter "C") is on every box of our make.

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Sweet's Patent Rubber Tire.

They have stood the wear for the past three seasons. Used by the best builders, are thoroughly Warranted. Machines for applying Tires are best made and within your reach. Write stating about how many sets of Tire you use and receive our proposition with full instructions for applying Tires.



The Diamond Brand Hardening Powder.

The Diamond Brand Hardening Powder is used when it is desired to harden parts of Iron and Steel machinery by the quick open fire process, which consists in simply heating the Iron or Steel, and sprinkling the powder on the pieces to be hardened; in this way they acquire a deep, fine, even temper, and a beautiful smooth polish.

It is used for hardening iron plates and the metal interiors of boxes, also axletrees, bolts, dies, pivots, pillows, shafts, stands, taps, tools, etc.

For pins and bushings and running repairs to locomotive engines, also for work required at short notice and for immediate use, it has no equal; it hardens more deeply, quickly, uniformly, and is more economical and satisfactory than any known chemical. Even when using the ordinary bone preparations for case-hardening, it is desirable to add some Diamond Brand Hardening Powder; care should be taken that all the surfaces of the pieces to be hardened are well surrounded with this powder; thus the usual lengthy heating by which the grain of the iron is often damaged and rendered brittle will be greatly lessened, and a better polish obtained.

This powder is entirely free from poison and does not contain any ingredients injurious to the worker.

Progressive railroads and machine shops use the Diamond Brand Hardening Powder.

Samples and Prices Cheerfully Furnished on Application.

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Dryden Rubber Hoof Pads



"BUCKEYE"
MEDIUM AND HEAVY
With Leather Back
Made in sizes
1, 2, 2½, 3, 3½, 4, 5, 6, 7, and 8.

Sold to Horseshoers
and Jobbers only



"DRYDEN"
MEDIUM AND HEAVY
Made in sizes 0, 1, 2, 2½, 3, 3½, 4, 5, 6 and 8. Patented August 27, 1901, No. 681,411. The "Dryden" Pad has a four-ply canvas back and being flexible is easily fitted . . . without trimming . . .

"CLOSED ROADSTER"
Leather Back
Red Rubber
Sizes
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Weight
5 to 8 ozs. per pad.



Ask Your Jobber
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"FULL FRONT"
"DRYDEN"
Leather Back
Cushion Roll
Made in Sizes
1, 2, 2½, 3, 3½, 4, 5, 6, 7 and 8.

Write for Price List
and Descriptive
Circular

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Canvas Back
Sizes
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4 to 7 ozs. per pad.



DRYDEN HOOF PAD COMPANY

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BUFFALO PORTABLE AND STATIONARY FORGES

Types and Sizes for All Requirements



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**SIXTY TYPES
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*Complete lines of Punches, Shears,
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Old Reliable Blacksmith Forge

All Buffalo Tools and
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**FIFTY-EIGHT TYPES AND
SIZES OF STATION-
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DOWN-DRAFT
FORGES**



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No. 03 D Stationary Forge

OUR GUARANTEE. The guarantee of the Buffalo Forge Company has always been: If any forge or blower is not as represented and perfectly satisfactory return AT OUR EXPENSE. That is why they have always been recognized as the standard of the world.

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—BUFFALO, N. Y.—



Every genuine "Hay-Budden" Anvil is made of the best American Wrought Iron and faced with best Crucible Cast Steel. Every Genuine "Hay-Budden" Anvil is made by the latest improved methods.

Hay-Budden

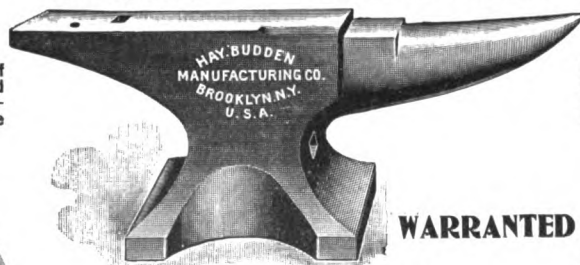
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ANVILS

**THE GOLD MEDAL ANVIL
HIGHEST AWARD**

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PAN-AMERICAN, 1901



WARRANTED

WEIGHTS FROM 10 TO 800 LBS.

OVER 75,000 IN USE

Experience has proved their worth and demonstrated that "Hay-Budden" Anvils are Superior in Quality, .. Form and Finish to any on the Market ..

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VOLUME 2

THE

NUMBER 5

AMERICAN BLACKSMITH

BUFFALO
N.Y. U.S.A.

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FEBRUARY, 1903

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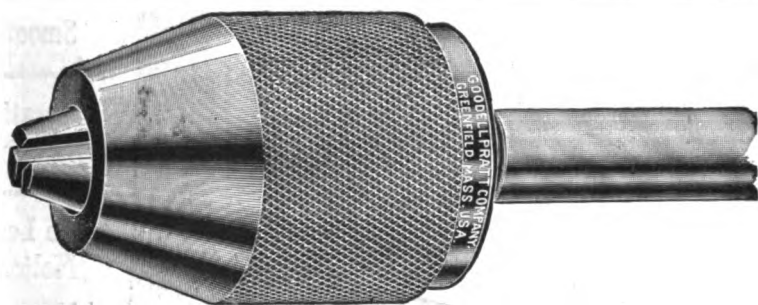
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\$2.50

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Furnished with $\frac{1}{2}$ -inch or
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JUST THINK OF IT!

A Chuck that will hold any Twist Drill from the very smallest up to $\frac{1}{2}$ -inch. If you have been using drills with $\frac{1}{2}$ -inch shanks, you can buy this Chuck and hereafter buy straight shank drills, and save the cost of the Chuck in less than a month.

This offer good only until MARCH 1st, 1903.

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BUFFALO HAND BLOWERS

Most Improved and Powerful Hand Blowers Made.

RUNS IN OIL

Your Dealer will Send One on Trial if Desired.

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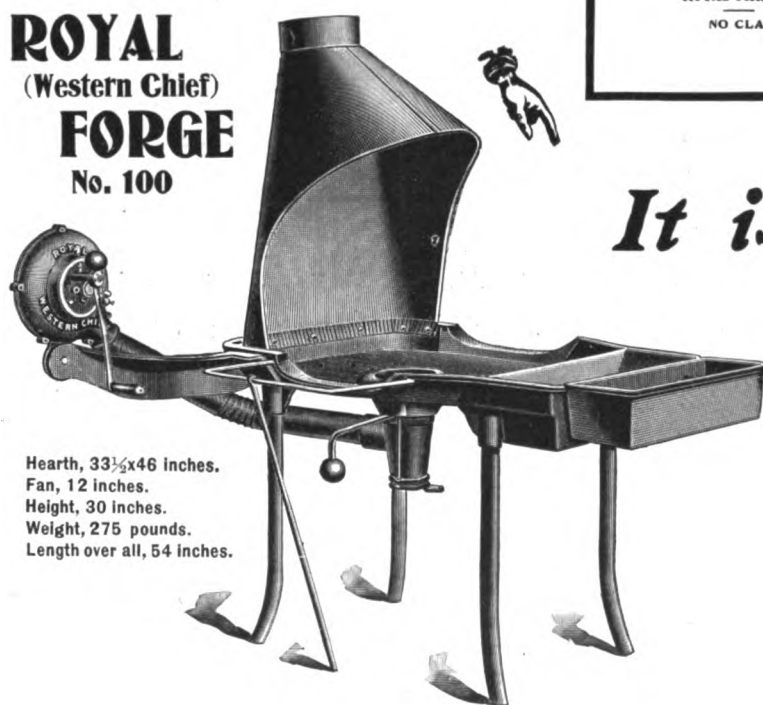
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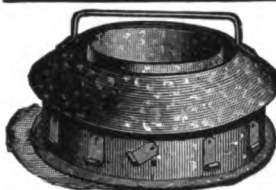
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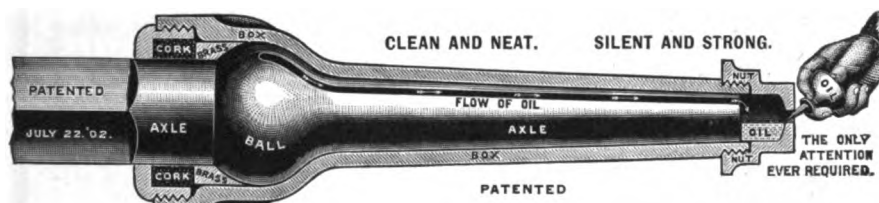
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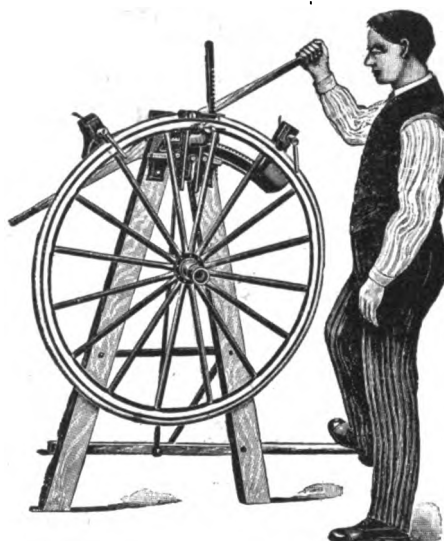
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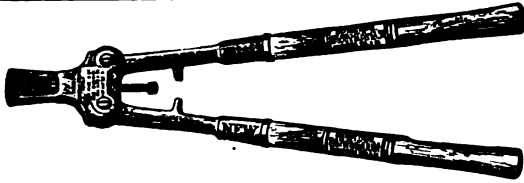
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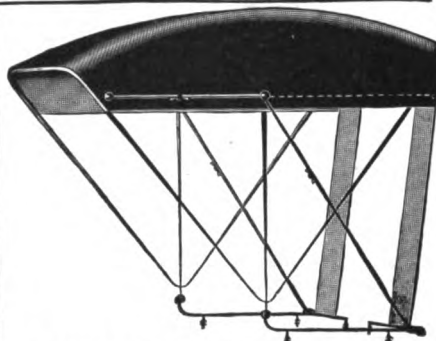
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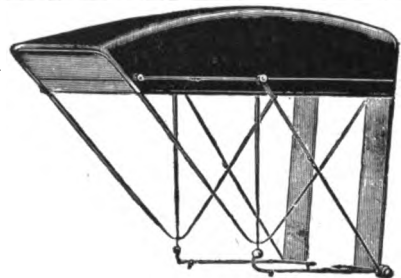


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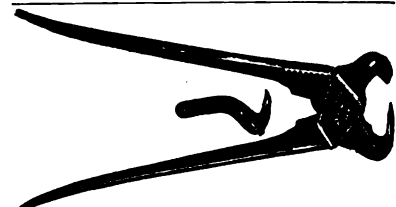
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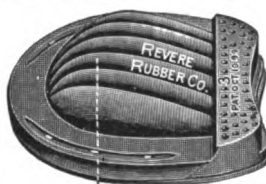
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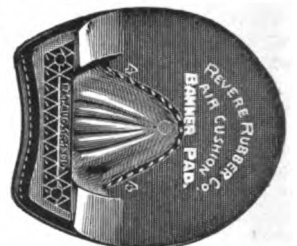
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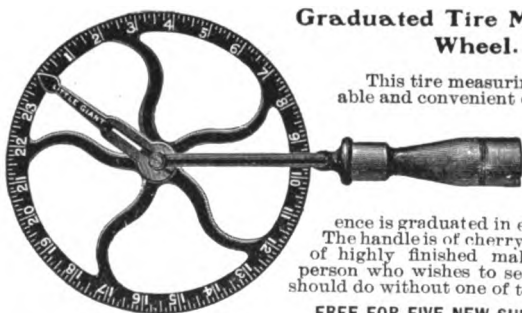
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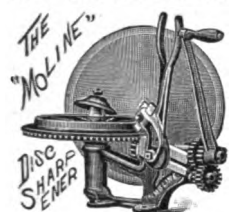


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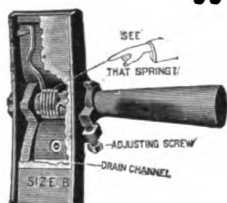
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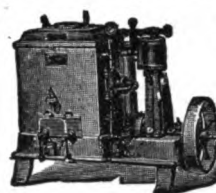
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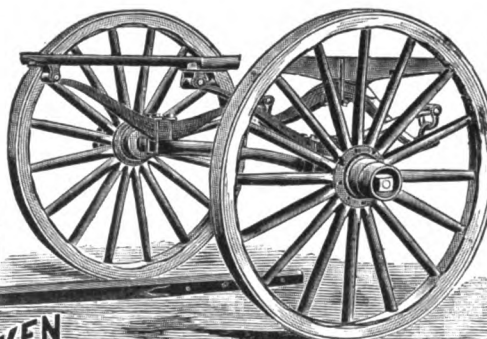
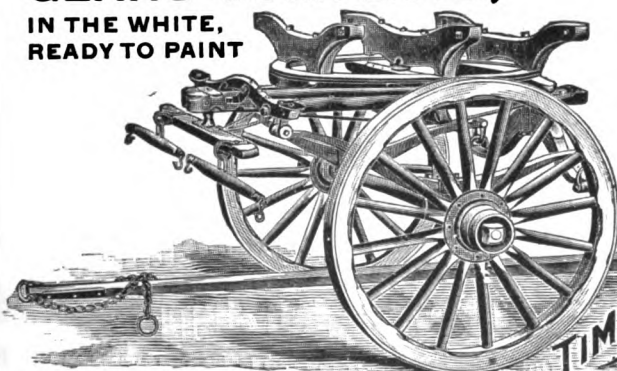
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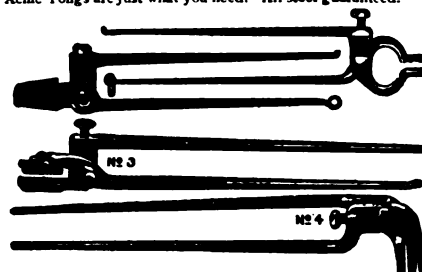
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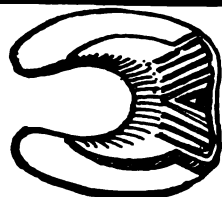
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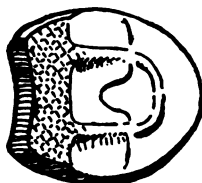
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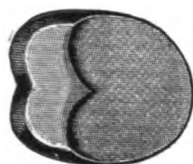
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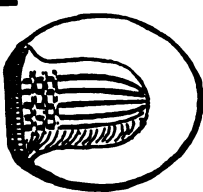
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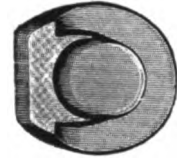
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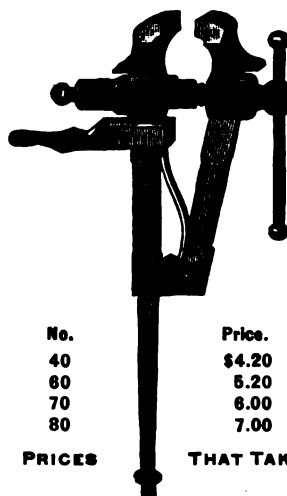
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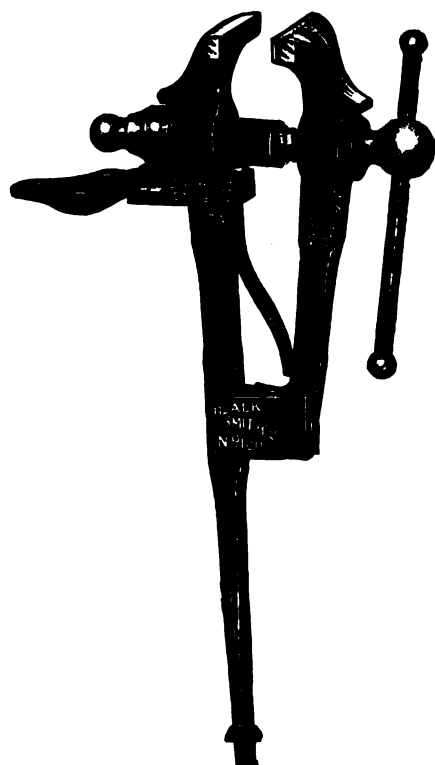
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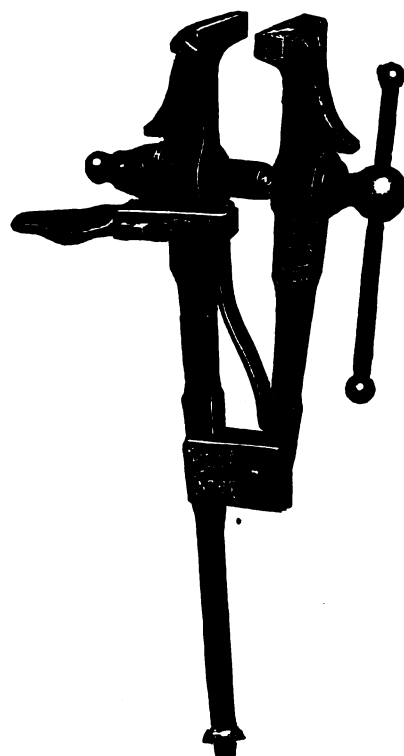
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A PRACTICAL JOURNAL OF BLACKSMITHING.

VOLUME 2

FEBRUARY, 1903

NUMBER 5

BUFFALO, N. Y., U. S. A.

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Cable address, "BLACKSMITH," Buffalo. Lieber's Code used.

Entered February 12, 1902, as second class mail matter, post office at Buffalo, N. Y. Act of Congress of March 8, 1879.

The Village Smithy.

The handsome new painting by Mr. Raphael Beck, which was bought by THE AMERICAN BLACKSMITH for complimentary presentation to its new subscribers, has been considerably, though unavoidably, delayed in reproduction. We are aiming to secure faithful and artistic copies, and will have to ask the patience of our friends for a short while longer. We do not wish to sacrifice any of the merits of the picture by unduly hurrying the engravers.

A Special Prize Offer.

For those who may see a copy of THE AMERICAN BLACKSMITH this month for the first time, we wish to briefly state our special subscription offer. As a special inducement we will send to all who subscribe during February, THE AMERICAN BLACKSMITH for twelve months, with a handsome copy of our picture "The Village Smithy," and also, as a premium, either a neat little pocket bench level, or else a farrier's hoof knife.

See your friends of the craft, tell them about the paper and induce them to subscribe. If you can get us any new subscribers in this way you will receive a more expensive premium. Write for particulars if interested.

As a special prize offer, we are going to give ten dollars in cash to the person sending the greatest number of new subscribers before April 1. A small number of new names, twenty or thirty, will probably win the prize. Isn't it worth your effort?

A New Electric Process of Steel Production.

A dozen or more of the leading independent steel manufacturers of the United States were in Lockport, N. Y., recently, to witness an important test of an electric furnace process for making steel directly from the raw material. It is said the test was successful and satisfactory.

The men who witnessed the demonstration were John Fritz, of the Thomas Iron Works, Bethlehem, Pa., and builder of the Cambria Iron Works and of the Bethlehem Steel Works; S. T. Wellman, of Cleveland, inventor of the Wellman steel furnace, of the firm of Wellman, Seaver & Morgan; W. J. Taylor, of High Bridge, N. J.; E. Thomas, president of the Catasauqua Iron Works, Catasauqua, Pa.; Walter Phillips, European representative of the Westinghouse Company, Pittsburg; Dr. Frank Slocum, of the Jones & Laughlin Steel Company, Pittsburg; E. Kirchoff, editor of Iron Age, New York. Superintendent Fred J. Davis, of the Cowles Aluminum Works at Lockport, extended the visitors every courtesy.

Inventor Marcus Rutheburg said, regarding the electric furnace process: "We apply electricity to the smelting of iron ore at about one-half the cost of reduction of ore through the blast furnace and steel hearth. The furnace has the advantage of all others in that it consumes only one-tenth the amount of electric power heretofore required in reducing iron electrically. This vast saving places our process on an extremely favorable basis of comparison with the old methods employed in the blast furnace and steel hearth.

"We take the raw material and cleanse it to the highest state of purity.

Reducing material in the form of charcoal or coke dust is incorporated with the ore and the mass is then fed direct to the electric furnace. A fritted mass is produced which goes to the open hearth furnace as steel melting stock, eliminating the expensive blast furnace process. This saves 33 per cent. of the fuel used in old processes and all the limestone, which is not employed at all. Using only 67 per cent. of the fuel, we manufacture a purer and better quality of steel."

The American Association of Blacksmiths and Horseshoers.

The great number of communications and letters of endorsement, which have been received at this office since the publication of the first announcement of the principles and objects of the above Association, would be all-convincing evidence, if any were needed, of how vitally the reforms aimed at affect the welfare of the blacksmith body. There has not been one dissenting note in all the many letters written us upon the subject. For the benefit of those readers who may not have seen the articles in question, the aims of the new Association will be briefly given.

It is proposed in the first place to arouse the sentiment of the craft regarding the passage of State laws, which will enable the smith to place a lien on a horse, wagon or implement, and thus be absolutely sure of prompt and rightful payment for his work. Another reform in view is to secure a general advance in prices on all smithing, shoeing and repair work. Since conditions vary with the locality, it would obviously be impracticable to apply the same prices to any large section of country. The idea is to organize each County of each State, and to have each county association adopt prices for itself. In these days of advanced prices of material and increased living expenses, it is absolutely necessary for the craft to "get together" and agree on prices which

will allow the smith and his family to enjoy a proper return from his labor. It is a well-known fact that prices of commodities rise much more rapidly than do wages and the returns from labor. Such days as these of prosperity and higher prices, mean in reality, "hard times" for those whose wages do not advance in the proper ratio. It means a greater amount of work must be done to secure an equal measure of living necessities and comforts. This, in our opinion, explains the straitened circumstances and "hard up" conditions of many of the craft. The laborer is worthy of his hire, whether he work for a master or for the public. Better prices are an urgent need.

Other questions, such as measures to improve the standard of horseshoeing, and the prices of material as charged by the various heavy hardware dealers, will be taken up by the Association. The undivided support of every member of the craft is needed to secure all these reforms, and you are earnestly requested to aid us by keeping in touch with the progress of the movement, as will be reported in these columns. An account of what has already been accomplished will be found on a following page.

Estimating Costs in Carriage Shops.—6.

BY D. W. M.

Aids in Making Calculations.

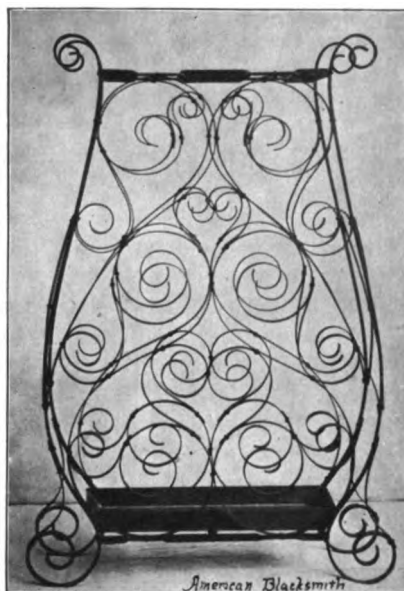
Very few shops have a blackboard large enough to accommodate a full size drawing of a coach, a large truck, or an ice-wagon, yet any one who has ever used such a board will wonder how it is possible to get along without one. The convenience which it affords is incalculable as an economizer.

Such a board should be made to be used on both sides. The original design of the contemplated vehicle may be drawn in small size to scale first, but the large or full size drawing will be found invaluable in determining the general effect of lines and proportions, and in getting the proper position in hanging off the gear. Also in calculating sizes of springs, wheels, blocks and various irons—in fact, anything belonging to the details of construction.

Chalk marks are easily corrected. After the blackboard sketch, permanent drawings and patterns can be made for preservation for future use. Some prefer not to roll the paper drawings, but to keep them flat, and hang them against the wall back of the blackboard, on hooks or clasps, but this grows too bulky in time. Each draft should be numbered,

and the same number stamped on all the patterns which belong to it. Bore a hole through each pattern and tie together all the patterns belonging to one draft, so that they may be hung up in a convenient place. On each pattern mark the number of pieces required for one vehicle, also the size of the material.

On the paper draft make a scheduled list of all the pieces required, if by pattern; for instance, a top rail, two pieces $1\frac{1}{4}$ by pattern; or rocker, two sets $1\frac{1}{2}$ by pattern, unless the pieces are straight, in which case the full dimensions are given with the quantity.



AN ARTISTIC UMBRELLA RACK OF WROUGHT IRON.

If any irons are to be forged, it is well to have not only the drawing and listed size but a sample. If it is such as can be used on other vehicles, it should be so indexed that it may be referred to by number. All forgings and malleables which are in use as regular stock should be so indexed, and samples kept, not in a heap, but hung up and properly labelled, as to be easily referred to or designated in any itemized list of materials, and found in an instant. This list of materials should include every piece of timber, the screws to the exact number, bolts, malleables, forged irons, springs, axles, wheels, etc. Nothing should be omitted.

It will be found a very great assistance to carry a book small enough for the pocket, in which each vehicle is entered by number. The pages should be ruled in columns, to show the number of vehicle, for whom built, date of order, date when body is made, wheels, springs, axles; or received in shop, ironed, pinned; shafts or pole made and

ironed; date of each coat of paint; when trimmed, finished, hung off, put in ware-room, shipped; and a column for remarks. To keep such a book means that its possessor is always fully informed about what goes on in his shop. It will also be found of great value for reference at future times. A book of this kind has settled for the writer a great many disputes and won several law suits, besides being of the utmost assistance in the daily prosecution of business. It enables one to know on the instant where anything lagged and the cause, and to produce work always when promised. With a fountain pen, one can make the entries in this book in passing through the shop, and if anything has been overlooked the book will reveal it at once.

Ornamental Iron Work at the Illinois State Reformatory.

In every branch of art, there are two elements—the artistic and the mechanical. The first element calls for natural taste and originality; the second for mechanical skill. A man may have the taste and originality to plan a design without the mechanical skill to execute it, or vice versa. Also a special understanding of the style of design suitable for development in different materials and for different purposes is necessary. Thus, a design that would be effective in wood or tapestry, might not work out well in iron or copper.

As the demand for decorative metal work grows, the supply of skilled workmen must be increased proportionately. Hence, various of our institutions are making special effort to develop and cultivate the artistic instinct in connection with blacksmithing, as well as to provide a thorough training in the execution of designs.

In the January issue was given an account of the work done by the blacksmith boys in the Illinois State Reformatory, but lack of space made it necessary to omit some very interesting photographs of achievements of these boys in ornamental iron work. The accompanying engravings represent three of the pieces. The first is an umbrella rack. It is $5\frac{1}{2}$ inches by 16 inches at the base and 26 inches high. The pan is of brass and the upper part of iron. The second is a group of very artistic rosettes and other decorative pieces. The third cut represents a collection of hinges and handles of pleasing design.

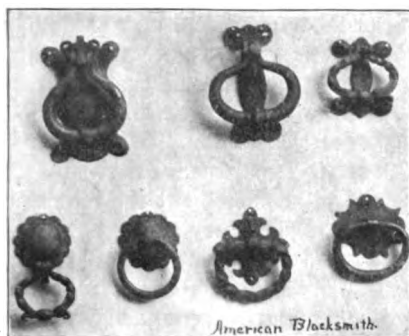
The boys range in age from sixteen to twenty years, and are put through a

thorough course of preliminary work to train them in handling their fires and their hammers. They are then advanced to welding iron and steel, horse-shoeing, carriage and structural iron work. The ornamental iron work of the boys marks still another step in their training.

Gear Painting Novelties.

M. C. HILLOCK.

Not a few trade writers have surrounded the subject of painting the carriage gear in aluminum bronze with an air of mystery, which in no respect belongs to the operation. To paint the gear in aluminum bronze, simply bring the surface up in the usual way and to the approved degree of smoothness.



SOME UNIQUE ROSETTES AND DECORATIVE PIECES.

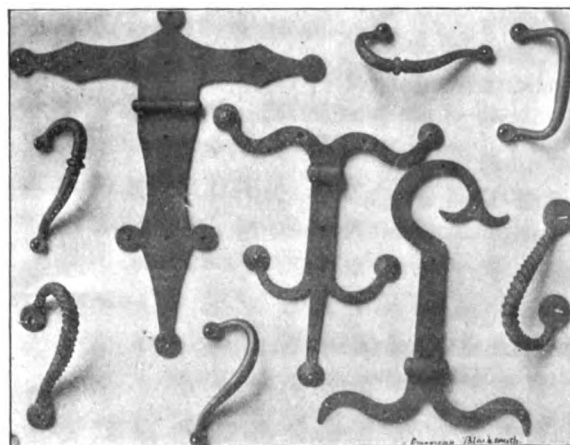
The last coat of lead, which should serve as the ground for the aluminum, should be made of white lead shaded out slightly with lampblack to bring it very close to the color of the aluminum, of which there are two distinct shades. To get a ground desirably near to the aluminum, it may be necessary to shade the white with ivory drop black instead of lampblack.

The writer has seen in the large carriage factories aluminum mixed as paint and applied to the surface with a camel's hair brush, but for the most luminous and permanent results, it is advisable to first apply a sizing and dust the bronze on dry. Apply a size of elastic rubbing varnish "let down" a little with turpentine. Locate the gear over a large square of wrapping paper, and when the right stage in the drying of the size is reached, dust on the aluminum powder, using for the purpose a 1½-inch camel's hair brush. Aim to coat up the surface solidly, so as to necessitate no touching up. Next apply, in due time, a coat of very pale or what some workmen would call "white varnish," laying on plenty of varnish. When this coat is adequately dry, rub over lightly with a wet sponge dipped

in No. 00 pulverized pumice stone. Never use hair or moss on a surface of this kind. The sponge rubbing not only serves to deaden the gloss, but aids to bring out the best sort of surface. The striping should be done upon this coat. Stripe in dainty shades of blue, and use double and treble lines, the double being more popular. Fine, nicely drawn lines of white furnish beautiful effects. A line of gold split in the center with a fine line of flake or Florence white looks very striking. Double fine lines of gold give a rich effect. Primrose and sulphur yellow in fine lines show handsomely upon aluminum gears. Occasionally the aluminum gear is blacked off with changeable or Prussian blue, and while this style of painting adds a certain effectiveness in the matter of color contrasts, it at the same time increases, apparently, the size and weight of the job. This is an optical illusion, and in the case of some colors the blacking off makes the surface look lighter in build, but in the case of aluminum, the effect is the reverse. In many cities, society has accorded the aluminum running parts its stamp of approval, hence the color may be expected to retain at least a brief season of popularity.

For heavy pleasure vehicles, the bottle green, formerly so popular, will be in favor as a gear color the coming season. For a particularly fine bottle green—one having depth and brilliancy, into which one may fairly look as into a mirror—only the bottle green as brought up fifteen or more years ago will suffice. Bring the surface up becomingly level and smooth, then apply a green made of chrome, lemon yellow and ivory black. This constitutes the ground work. Next procure Dutch pink and Prussian blue, Japan ground, and mix the two to a fine rich bottle green. Exact proportions of these ingredients cannot be advised owing to the varying strength of pigments, but the practical man used to handling colors will be able to hit the shade handily enough by working a bit carefully. The Dutch pink and Prussian blue mixture, having been applied with a camel's hair brush and given a few hours to dry, may next be glazed with yellow lake. To a pint of the yellow lake, as mixed in elastic rubbing varnish, add a tablespoonful of

Dutch pink. Flow this lake coat on as freely as a clear rubbing varnish coat is flowed. For an exclusively brilliant and aristocratic green, the bottle green as thus produced has no rival. It has an elegance and a beauty unsurpassed. Striped with black and carmine lines, or with black and gold, it appears at its best. If the green is expected to have an olive hue, add a drop or two of English vermilion and ultramarine blue to the yellow lake. Newport red, titled after the city made famous by Henry Watterson and America's Four Hundred, is to be one of the popular gear colors for boulevard and park wagons the coming season. Bring the gear up in a light peachblow color, and then mix English vermilion in varnish, thinning out with turpentine to the proper consistency, then add, say, No. 40 carmine in the proportion, practically, of one part carmine to two parts vermilion. Apply with a 1½-inch badger hair brush. The color mixed in varnish will go on more in the nature of color-and-varnish than as a flat color coat, but this need not disturb the workman. If the peachblow ground is properly builded, one coat of vermilion will suffice. Next, to enrich the vermilion, glaze with No. 40 carmine. Buy the carmine in collapsible tubes, and ¾ of an ounce, floated in sufficient elastic rubbing varnish to coat the gear entirely, will suffice. This color is best striped with lines of black, although double fine lines of gold show handsomely, and are often used effectively in conjunction with the black.



COLLECTION OF HINGES AND HANDLES OF PLEASING DESIGN.

For surrey, phaeton and cabriolet gears, olive green promises to be popular the coming season in eastern sections of the country. Olive green—all greens, in fact, which possess an excess of yellow in their composition—is a warm, rich green easy to handle, and

quite as permanent as any of the other greens. You simply bring the surface up dark, lay on a coat of the flat color, and then apply a coat of green color-and-varnish. Give this coat a gentle rub over with a soft sponge dipped in pumice-stone-flour and water. Olive green offers handsome contrasts in color if striped with double lines of carmine, or a $\frac{3}{8}$ -inch line of black, edged with a fine line of carmine.

Maroon, while not exactly a novelty, is not so common as to be called commonplace, and, as for a couple of seasons past, it will hold in favor with many exacting vehicle users as a gear color. If shop made, maroon is compounded of three parts No. 40 carmine and two parts lemon yellow. Use the final coat of maroon as a glaze color, and for the most exclusive effects stripe with lines of black.

Shrinking a Wagon Band.

M. S. HEWITT.

To shrink a wagon band, take an old rasp, either straight or bent in a half circle. Heat the band and make a kink in it, and placing it on the rasp at the kink, catch on either side with tongs and drive the kink down straight with the hammer. By this means, wagon bands may be quickly upset and shrunk when they become loose.

Pointers on Box Setting.

CHARLES D. BRIDDELL.

I find very often that I wish to put in thimble skein boxes, or large axle boxes, and desire to get the wheels perfectly true without much wedging of the boxes. The following is the way I should suggest that this be done: Lay the wheel down on its side with the big end of the hub against the floor. Place the box and the hub small end down and put it at the center as near as possible. Then take a small rod and place one end of it against the box, and get the measure from the box to the edge of the tire. Measure on the opposite side of the wheel from where you first measured, and if both measurements are not the same adjust the box until it is exactly in the center. By repeating this process of measuring, and adjusting half-way between the points where you first measure, you will be able to get the same accurately in the center. Having done this, mark around the box carefully. Then turn the wheel over and proceed exactly as before, placing the big end of the box down. Chisel out for the box where you have marked, drive it in and you will find that the wheel is nearly true. Place

the wheel on the axle so that it will have room to turn, and by means of wedges, you can use the wheel perfectly.

The great advantage of measuring in the above way is that a great many wheels are dished on one side more than on the other, so that if the box is put exactly in the center of the hub the wheel will not be true.

A Youthful Member of the Craft.

In the issue of May, 1902, we published an account of the oldest blacksmith which we were able to locate, Mr. Samuel Brock of Falmouth, Ky., who was still working at the age of ninety-four. In this issue we reproduce the photograph of a youthful blacksmith, Mr. John Schaffer of Elkton,



A YOUTHFUL DAKOTA SMITH.

S. D., who, although but seventeen years old, has been working steadily with his father for the past four years. He states that he has learned all he knows in his father's shop and by picking up knowledge wherever he could. On another page in this issue will be found an article from this young blacksmith on the advantages of the gas engine.

Factory Cost Systems.

In the carriage trade, and in any trade, an accurate knowledge of shop and office costs is absolutely essential to an intelligent conduct of the business.

The question of determining the cost of production bears such a vital relation to the profits in every factory, that the following system for conveniently figuring shop and office cost will doubtless

be of interest. We are indebted to the Shaw-Walker Company, Muskegon, Mich., makers of card index systems, for the following outline of a simple method of determining the cost of production, and one which can be enlarged to meet the requirements of almost any business.

Card systems lend themselves splendidly to methods of this kind. In the first place, all stock should be received in the stock room, and there recorded on cards. One person only should have charge of keeping these records. No stock should be issued to any department in the factory, except on written requisitions, signed by the foreman of the department in which it is to be used.

Factory orders should be issued to each department through which an order is to pass. These orders contain the order number and the shop order number, together with instructions as regards its execution. When the foreman of the department has received his order, and has made out the requisition for all the necessary stock, he is ready to proceed with the work.

He will assign the work to certain workmen, who make out a time card, bearing the order number and the kind of work to be performed, and sign his name and number and make a cross on the card at the time work was commenced. When the job is finished he makes another cross and turns the card in to the foreman, who OK's it. The time cards are then turned in to the cost clerk, from which the cost of productive labor can be figured on any order, as each card bears the order number.

From the requisition slips can be figured the cost of material entering into the construction. These two systems will give the exact cost of what may be termed "known quantities."

Unknown quantities, such as non-productive labor, general expense, etc., can be figured in a number of ways. We consider the dollar basis the most satisfactory method of determining the cost of non-productive labor. Determine the cost of productive labor in a given department for a given period of time, say the pay roll period of two weeks. This we will suppose amounts to \$1,000.

Then also determine the cost of non-productive labor for the same period of time and in the same department, which we will suppose to be \$100. Dividing the latter by the former will give you 10%. Then in determining the cost of productive labor for any

department, add 10% to cover the cost of the non-productive labor.

The percentage will vary in different departments and will vary in the same departments for different periods of the year, as the proportion of productive labor changes.

General non-productive labor, such as engineers, superintendents, teamsters, etc., labor that does not enter directly into the cost of production, but that is necessary to the work of manufacturing, can be figured and pro-rated over the entire cost of productive labor in a similar manner to the method of figuring it by departments.

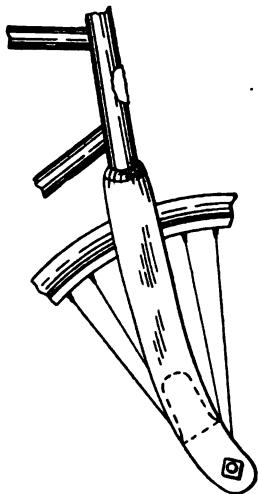
General expense, including rents, taxes, insurance, selling cost, etc., can be determined for a period of time and pro-rated over all the orders completed during that time.

The above system is one that has been installed in a great many concerns. It has been given practical test and found successful. Of course the forms have to be changed to meet the varying conditions governing each different concern.

Repairing a Broken Bicycle Fork.

J. H. JENSEN.

The following method of repairing the fork of a bicycle which has been broken off will be found very handy at times. Saw off the tube of the fork a little above the break, say from 1 to 1½ inches up. Then take a small rat-



A UNIQUE METHOD OF REPAIRING A BROKEN BICYCLE FORK.

tail file and file out the inside until you get a feather-edge on the fork tube all the way around. The next step is to forge a piece of soft steel, which will drive up inside the end of the fork for about an inch or more. In the illustration, the part which is driven up in the fork is indicated by the dotted lines. The part which is outside is to be forged like the old end of the fork, and either drilled or slotted for the spindle. The forged piece outside should be the same size and shape as the fork at the point where they join. If a slot is

desired in the end of the fork, bore a hole at the proper point and cut the slot down with a hack saw. The new part can be dressed down smoothly with a file. If the bicycle has black enamel on the forks, I warm the new ends a little and brush them over with coal tar, after which no one can notice that the fork has ever been broken. I do all the broken fork repairing for the two wheel repair shops in town, and have never had any complaint as to strength or looks. My charge for this work is seventy-five cents an end, and I can easily put on about two ends in two and a half hours.

To secure the repair parts in place, I usually resort to brazing. First, clean the parts which are to be brazed and prepare a well coked fire. Then place the pieces on the fire and blow gently, so as to heat the parts uniformly and without danger of overheating. Keep the joint well covered with powdered borax. When this begins to melt down, put your pieces of spring brass or soft brass on the joint, so that when the same melts it will run into the joint. As soon as the brass has been melted and run into the joint, remove from the fire and allow to cool off. Close attention should be paid to the heating and to the brass, so as not to burn the latter.

Recipe for Cleaning Brass Articles.

W. J. HILL.

The following is a good recipe for cleaning brass articles: Six large spoonfuls of cider vinegar and two spoonfuls of salt. Put in a bottle and keep ready for use. Apply with a small cloth, rubbing well. All stains will disappear and the brass will be as bright as when new. Wash the vinegar off and dry the brass, as it will become discolored if left on.

Firmer Socket Chisels Made From Old Files.

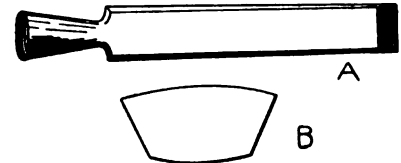
C. F. HEINE.

The accompanying sketch illustrates the manner in which I make firmer socket chisels from old worn out files. I make a number of these from 1½ to 2½ inches for my customers, both farmers and carpenters.

I first take a file, a mill cut for the small size and a bastard for the large size, and grind them as nearly smooth as possible, and then draw them down for the socket, as shown at A. Having drawn it down to the size which I wish, I make a pattern by wrapping a piece of cardboard or stiff paper around the

upper or handle end, and using this, cut out a piece from 1½-inch iron, which I shape, fit and weld for the socket, welding to the chisel first.

Care must be taken to have a nice, clean fire, and keep the piece turning, so as to get a good even heat and not



MAKING A FIRMER SOCKET CHISEL FROM AN OLD FILE.

burn the iron or the socket. Then turn and finish the chisel and temper to a pale blue. This produces a chisel which is hard to beat, and which will stand more prying and jerking than most factory chisels. I would like to hear from others as to their experience in making chisels from old files.

The Handling of Vicious Horses.

C. E. GOULD.

The following way of handling vicious horses has never yet failed me, and I have used the same to great advantage time and time again. My method is to attach a good, strong eye-bolt to an outer wall for the purpose of tying the horse up. I then take a ½-inch rope thirty-five feet long, tie it to the top of the collar of the horse, pass it back to the tail, around the roots of which I take a half hitch. The rope is then placed through a pulley which has been strapped to the hind foot to be shod, and from there leads up to a pulley at the ceiling, fifteen feet from the front wall. By my arrangement I run the same rope through still another pulley, which is attached to the anvil block below and still a little further back, say sixteen or eighteen feet from the front wall. In addition to this, I take another rope about fifteen feet long, tie it to the strap around the foot which has the pulley on it, run it outside the front leg, take one turn around the collar and then one turn around the ring in the wall. One man should hold the rope so as to give the horse a little slack, or take it up in order to get the foot in the right position for shoeing. One man also has the rope which ends at the anvil block.

When the horse jerks, the slack on the rope can be taken up and the foot pulled high. The horse will soon give up, and can then be shod.

If the horse is bad with his front feet, put the strap on while the hind foot is up. Leave the rope tied on the

tail and then make the pulley fast to the strap on the front foot, after which you can proceed as with the hind feet. This may seem a very cumbersome method, but the cost is small, and once in operation it saves many a lame back.

The Railroad Blacksmith Shop.—4.

W. B. REID.

Repair of Rockers.

A fracture in a rocker above C, Fig. 15, may be repaired by either of the methods described in the last issue, or when the shape of the broken part is favorable, more expeditiously as follows: A piece of iron of sufficient thickness for the purpose is welded on the old collar, from which the arm is broken

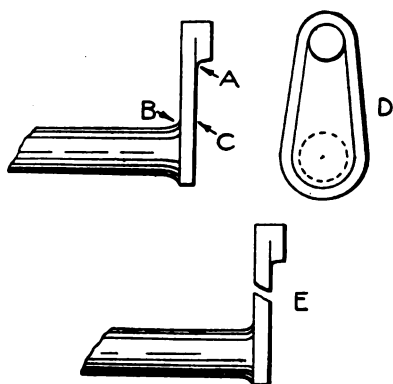


Fig. 15. ROCKER ARMS, FRACTURES AND REPAIRS.

off. This should be done under a hammer, the bottom die being removed if necessary. A few vigorous blows effectually weld the parts, and at the same time upset and reinforce the stock on the shaft sufficiently for further operations. The new arm can then be welded upon the enlarged collar thus secured, by methods described in a former article. If the fracture at this point is of a slight or partial character, it can be repaired as in Fig. 21, A. A small cavity in one or both sides is formed with a fuller in such a way as to augment the stock of surrounding surface. Into this, a small plug is welded with separate heats. Light manipulation with hand hammers welds this neatly and securely, with but slight disturbance of the proportion of the arm.

Straightening the arms and adjusting the centers of rockers is a frequent necessity of locomotive repair, requiring considerable neatness and accuracy on the part of the blacksmith. Rocker arms are sometimes distorted into unseemly shapes (Fig. 21, B), in attempting to restore centers to line by bending the arms. This can be done in a simple and more workmanlike way by heating and twisting in the center of the

shaft. Although regarded with disfavor by some, we have followed this practice successfully for many years. By heating slowly in a small open fire, covering the part to be heated with egg-sized pieces of clean coke, instead of wet sulphurous coal, a uniform dull red heat, sufficient for the purpose, can be secured without scaling the rocker shaft in the least. Placing the rocker flatly upon the surface plate, and holding the heavy sledge or weight upon one arm, a smart blow of the sledge upon a flatter held near the end of the other arm succeeds in twisting the shaft without disturbing the true line of center. To do this work accurately, a true surface plate, a surface gauge, two short parallels or straight edges and two pairs of adjustable cone centering tools are necessary. The tool described below is not found in general use, although it is a remarkably useful and accurate device for gauging centers in various kinds of motion work. Fig. 22, A and B, are two hollow cones of soft steel, hardened. A pin, C, centered accurately on both ends, of sufficient length and thread for adjustment to different sizes of holes, passes through both cones, holding them in position by nuts on the ends of the pin. When applied to both arms of the rocker at once, the condition of the centers can be determined quickly and with perfect accuracy. The application of this tool will readily appear from the illustration Fig. 23.

(To be continued.)

Setting Up a Gas Engine and Some of the Benefits From Its Use.

J. K. RIBLET.

It will probably be of benefit to those intending to put in power to tell them my experience. First, however, I will say that if I wanted to buy an engine, I should write to The Ajax Engine Works, Corry, Pa., and the Superior Gas Engine Works, Springfield, Ohio. When I set up my engine, I blocked up solidly under the floor joists and set the engine near the wall, bolting it to some heavy planks on the floor. Whenever the engine was running you would think there was an earthquake, so I cut a hole in the floor a little larger than the base of my engine, and built a cement foundation, wider at the bottom than the top, which comes just even with the top of the floor. The engine runs perfectly steady now, and the building behaves in a proper manner.

I have a wood lathe, two emery wheel stands, one jig saw, one blacksmith's

drill, and a saw table with four circular saws, three rip and one cross-cut, all of which I run with power. I did not buy one of the above machines expressly

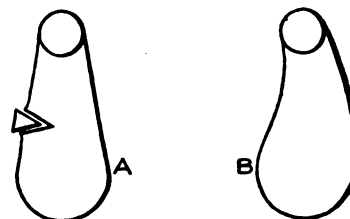


Fig. 21. A, METHOD OF REPAIRING A FRACTURED ARM. B, ARM DISTORTED IN ADJUSTING THE CENTERS.

for the purpose. The drill I had, so I put a wood pulley on the back feed, and now run it by hand or belt. The wood lathe I made myself, also the emery wheel stands and saw table. I got an old Champion binder worth \$2.00 for old iron, dissected it, and found, among other useful things, several nicely turned shafts, suitable for countershafts, saw and emery wheel arbors, etc. I am sorry to say I have no iron lathe yet. Hence I took three of them to a machine shop and had suitable collars, threads and nuts put on at a small cost. I have a very efficient jig saw of my own device and manufacture. I made nearly all my own pulleys. My line shaft is eighteen feet long and $1\frac{7}{8}$ inches in diameter, turned up full length, which enables me to put a bearing or pulley at any place. I run my line shaft at about 350 revolutions per minute, in three hard wood boxes or bearings, which are perfectly satisfactory. My circular saws I bought very cheap of an old mill man. Two of them had cracks and broken teeth, but were larger than I could use, so I cut off the outside until they were sound, and with the aid of my emery wheel made new teeth on them. When I get an accumulation of old poles, shafts, axles, edgings, etc., I take off the rip saw, put on the cut-off, and buzz up a nice lot of wood. I intend to fix up a hub-boring machine next. There are no cider mills

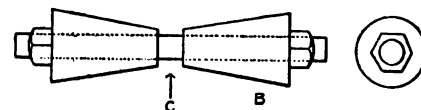


Fig. 22. TOOL FOR GAUGING CENTERS IN VARIOUS KINDS OF MOTION WORK.

or feed mills near here, and if I could sell my engine, I would get a larger one to grind feed and make cider. A 14-inch saw is as large as I can run profitably. Saws from ten to fourteen inches should run from 1,800 to 2,200 revolutions per minute. Emery wheels should run at a surface speed of nearly a mile

a minute. If run too fast, they will glaze, and if too slow they will waste or cut the work they do. I have a countershaft to run my emery wheels from, and another for my saw. After I bought my engine, I built a house, and sized all my studding and upper joist with my rip saw, also ripped out all cornice corner boards and frame stuff.

A Convenient Arrangement for the Post Drill.

A. BRUTON.

Here is a little device which may be useful to some, as it certainly is to me. It consists simply of an arrangement to lower or raise a post drill. I first take a hardwood plank 6 inches

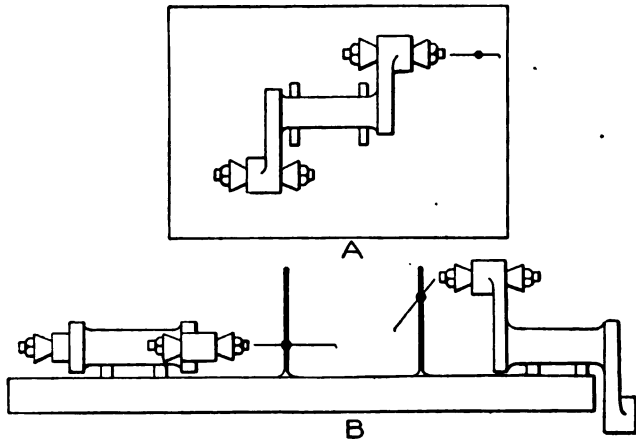


Fig. 23. DETERMINING THE CENTERS OF ROCKER ARMS.

wide by 5½ feet long, or longer if needed. I cut a slot in each end large enough to let a ½-inch bolt move up and down. Chisel out a place for the head of the bolt, so that it, with a large washer, can work up and down even with the surface of the board. Bolt this arrangement to the wall, where the drill is to be placed. Then proceed to make a crank or lever-nut for the bolts that hold the drill board to the slotted plank, so that these nuts can be tightened up without a wrench. This arrangement which I have described will allow the drill to be moved up and down, adjusted, and easily fastened at any convenient height.

In order to have a means for easily raising or lowering the drill, I fasten a lever to a post at the left of the drill, by means of a lag screw, placing the short end of the lever under the drill board. By means of this, you can raise the drill up as desired, and fasten it by tightening up the crank-nuts. Most drills are up a little too high for any thing except wheel work, but with this arrangement they can be adjusted to any height in a minute with great ease. The lever can be raised up out of the way when not in use.

The convenience, simplicity of construction and the small cost of this device are only a few of its points of advantage. To fully appreciate it the smith must try one for himself.

Blacksmithing—A Year of Work in Canada.

The following yearly routine of blacksmithing work, as it comes to the smith shop in Canada, will probably be of interest. We are indebted to Mr. George Nablo of Fisherville, Ontario, for the information contained herewith.

Repairing of sleighs usually begins about the first of November and continues until the latter part of March. Next comes the repairing of soil tilling implements, such as plows, harrows, cultivators, disc harrows, and all such implements which are required for putting in the spring seed. The shoes on horses that had been made sharp during December, or during the winter's icy roads, are then taken off and replaced with dull or mud calks.

After the spring seeding is finished, preparations are made for the hay cutting, and mowers, horse-rakes and hay-racks are put in condition. Also the farm wagons are repaired. Mowers are then almost constantly before the smithy for repairing break downs of some sort.

The season for that class of work having passed, harvesting of wheat commences about the middle of July, and during that time and all through August the repairing of binders takes up the time of the smith almost exclusively. Also during July and August, the weather being favorable and dry for harvesting, the roads become dusty and hot, which has the effect of drying up the spokes and felloes of wheels as well as expanding the tires of the wheels. The latter become loose and that is the time for tire setting, which often, when the drought continues, extends through September and part of October.

After the grain is cut and housed in the barns, plowing for fall wheat commences, and then the repairing of plows is much in demand; and this is with me, the main season for plow work. Threshing of grain is on, and repairing engines and grain separators takes up

considerable time, so that the months of August and September are often very busy periods of the year.

In October, repair work somewhat slackens, except the sharpening and repairing of plows and cultivators for the fall seeding and fall plowing.

The above is about the routine work of a year in a repair shop in this locality. Horseshoeing with sharp calking commences as soon as the frost sets in in earnest, and is usually at its height about the holidays. During the preparations for putting in the spring as well as the fall sowing, grain drills often have to be repaired, and the wheels respoked, which often takes considerable time. During the haying season, horse-rakes have to be repaired, teeth which break have to be welded, the tines of broken forks welded, new handles put on forks—which is a part of the miscellaneous work which comes to the shop for the repair smith to do. Such is a synopsis of repair work here on heavy clay soil.

Oil Furnaces and Their Construction.

H. A. FOLK.

Any one who wishes to employ oil for fuel should, in the first place, know exactly what he is going to heat with the oil, and then proceed with the building of the furnace to suit the class of work he intends to use it for, making the furnace as small inside as possible to admit the work, and avoiding sharp corners and square edges as much as possible. This is so that there will be no obstructions in the way of the flame. One should also be careful not to allow the oil to come in contact with the material. The burner should either be put above the material or below it, and, by having all corners rounding, the flame will form a circle or combustion chamber, as it were, and there is where the stock is heated. If the oil and blast are too close to the iron, it will form a heavy scale and will not heat. This of course can be detected very quickly by the scaling of the iron.

We have in successful operation at the Altoona Shops of the Pennsylvania Railroad, two furnaces 18 inches by 12 feet, and one furnace 18 inches by 4 feet, which do the heating for six power hammers. We also have a furnace for a 6-inch forging machine, on which we make all our transom irons for four and six-wheel trucks, and for all upsetting of axles. There is also one furnace for a 5-inch forging machine for heavy work, and one for a 3-inch forging machine;

one for a drop hammer and six for bolt heating. With the latter, we turn out from 4,000 to 4,500 $\frac{1}{2}$ -inch bolts in ten hours. The consumption of oil for ten hours per day, when all these furnaces are in operation, is about twelve gallons.

A Few Useful Original Devices.

C. S. SIMMONS.

The following are a few tools that I have devised and which I think will be of great practical use to any blacksmith who tries them.

The first is what I call a "no-helper" swage. Take two old buggy-stubs. Turn down a stem and weld on a hinge as shown in Fig. 1. Make the outer end of the top piece on an angle as shown, to catch the hammer under, when opening to insert work. Put in the hinge pin, clamp together and drill holes on the joint. Round off the corners a little as shown in Fig. 1, and the tool is complete. It does good work and has the advantage of combining a number of tools in one.

Another useful device is a heading or upsetting tool for a vise made as follows: Take old buggy-stubs, cut to

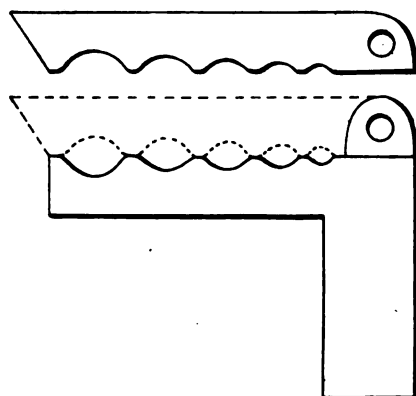


Fig. 1. A HOME-MADE SWAGE FASHIONED FROM OLD BUGGY STUBS.

the length of the vise jaws. Square-fuller a lip $\frac{1}{4}$ inch from top edge to rest on vise. Make a flat spring, as shown in Fig. 2. Fasten to one end securely, so as to hold the jaws, and open them about $\frac{1}{4}$ inch when inserting work. Put a piece of hoop iron $\frac{1}{8}$ inch thick between the jaws, clamp together, drill hole on the line as shown in Fig. 2, and the tool is done.

I have also devised a tire bolt holder which I call "La Grippe." To make one, form a thumb screw $\frac{3}{8}$ inch round, punch a hole in the end and weld in a bit of steel. Sharpen, thread, and harden the point, and you have a first-class tire bolt holder. Fig. 3 clearly illustrates this tool.

It so often happens that portions of old implements or vehicles may be turned to account in the construction

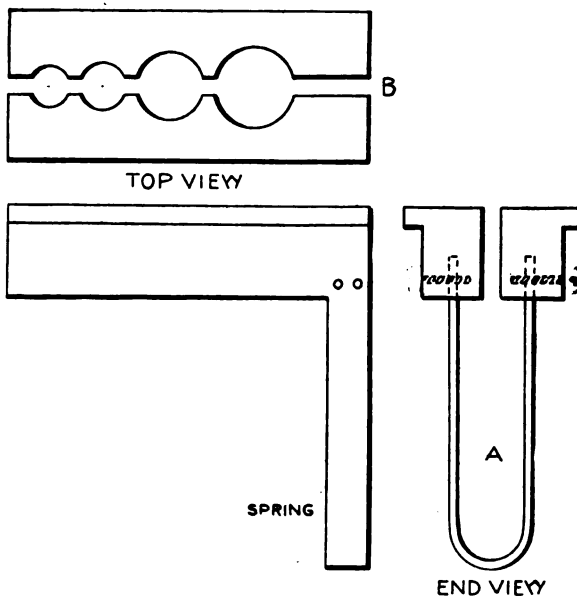


Fig. 2. A HOME-MADE TOOL FOR UPSETTING AND HEADING USES.

of home-made devices that it will pay any smith to have a few such odds and ends always on hand. Old buggy stubs, especially, will work up in almost innumerable ways.

The Grinding Wheel.

BILLY BUNTZ.

So useful is the grinding wheel that certainly it should be of the best. A carborundum or corundum wheel is excellent, although there are plenty of excellent emery wheels.

The grade or hardness of a wheel is determined by the way the wheel is made, or the kind of binding material used to hold it together, while the fineness or grit is determined by the size of the grains or particles. For efficiency, wheels of different hardness and grit should be used on different metals, as one wheel might prove too hard for some kinds of work and only glaze the metal, while another wheel might be too soft and wear away in a short time. The smith needs wheels of different hardness and grit, just as a carpenter requires sandpaper of different grade and number. It is a waste of time to use a very fine grit on heavy grinding and injurious to use a very coarse grit on fine tools. The size and nature of the work determines the size of the wheel. Small wheels from one to twelve inches answer for tools, while plow-shares require a large wheel, one forty inches in diameter sometimes being used, although wheels from twelve to twenty inches are sufficiently large. The grinding surface may be of any width up to about four inches.

Should the smith rely on the manufacturer to furnish a wheel adapted to his work, he should state the kind of metal he wishes to grind, the size of the work, and how fast he wants to do it, giving his previous experience, and stating what trouble he has had with wheels, if any.

The revolutions per minute a grinding wheel should make depends upon its diameter and the compactness of the grain of the wheel. Generally speaking, manufacturers are agreed that a surface speed of between 5,000 and 5,500 feet per minute should not be greatly exceeded, else the wheel might burst, while if it runs considerably slower the wear on the wheel will be heavy. Taking 5,000 surface feet per minute as a basis for the peripheral velocity for all wheels, a wheel six inches in diameter may run 3,183 revolutions a minute, a 10-inch wheel 1,910 and an 18-inch wheel 1,061, while a very small wheel may run at a terrific rate. In order to equal a surface speed of 5,000 feet a minute a 1-inch wheel must make over 19,000 revolutions.

To insure safety, a wheel should be carefully inspected before being mounted, and it is also well to look it

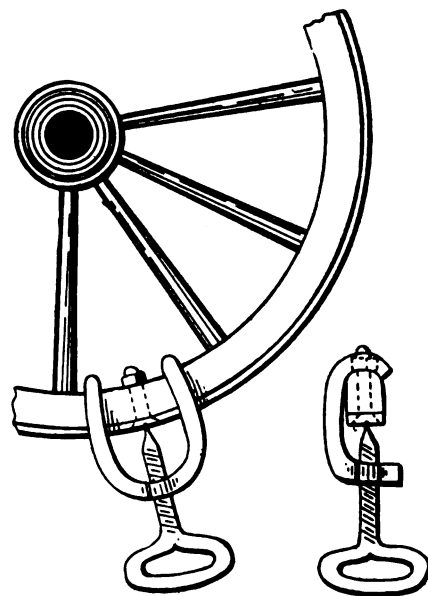


Fig. 3. A USEFUL ARRANGEMENT FOR HOLDING TIRE BOLTS.

over occasionally, as a car inspector looks at car wheels under railroad coaches and by hammer taps learns if they have a clear sound. The wheel

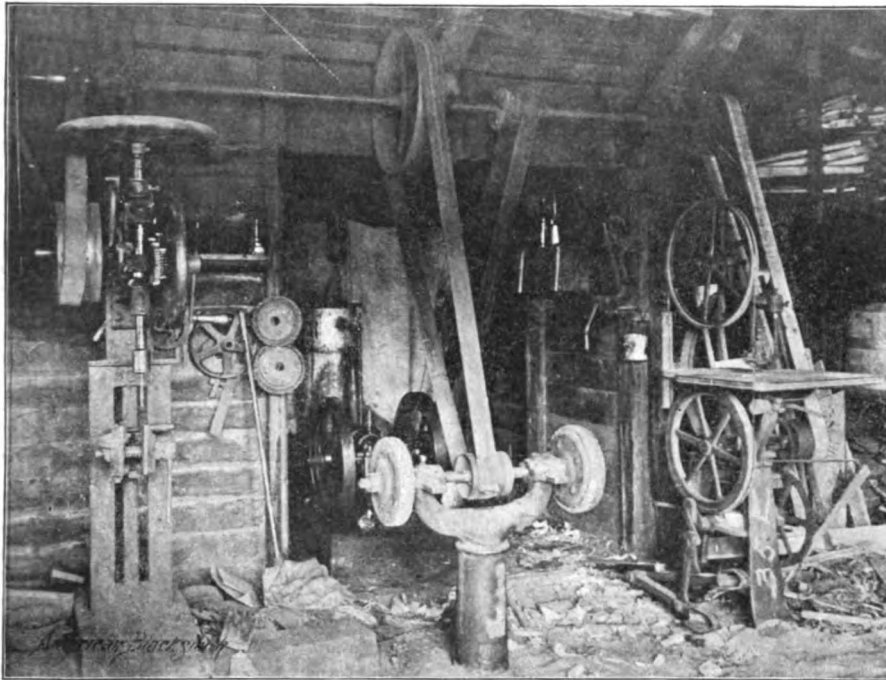
should not fit too tightly on the mandrel, else its bushing might become heated from the shaft or journal, and expand, causing the wheel to crack or burst. However, it should not be so loose as to wobble.

Spindles should be protected from grit by dust-proof collars or shields to increase the life of the bearings, otherwise the journals will probably overheat and possibly become fractured in time, and break. There should be no end-motion. Spindles and stands should be sufficiently strong and heavy for the

various designs, as cup wheels, cylinder wheels, gummers, etc. For flat surfacing and squaring edges, a ring-wheel fitted in a chuck may be used, which insures better work and more of it than when grinding upon the periphery.

When needing wheels for special work, it is best to write the manufacturer direct, as the jobber usually is familiar with standard goods only.

The engraving shows the smith and wagon shop of I. W. Pirtle & Company, Wilsey, Kan. The floor plan of this shop appeared in the January issue of



SHOP OF PIRTLE AND CO., WILSEY, KAN. CORNER SHOWING BELTING ARRANGEMENT, ENGINE, GRINDER, DRILL AND BAND SAW.

size of wheel used, and it is better to have them plenty heavy enough than a little too light. A medium-sized wheel and floor base may weigh 400 or 500 pounds, while a large one may scale at 2,000 or 2,500 pounds. Bench stands weigh from 25 pounds to 500 pounds and require a strong fastening to hold them steady, as the wheels run at lightning speed.

On account of the high speed of grinding wheels they necessarily take a large shaft-pulley to drive them, one thirty inches frequently being necessary. As a pulley of this size is rather large for a small line shaft, it is best to drive the grinding wheel from a countershaft. By using a tight and a loose pulley on the line shaft, the countershaft may be switched in or out. A friction clutch is excellent, but its cost is too often beyond the means of the smith.

Grinding wheels may be had of

THE AMERICAN BLACKSMITH. The double emery wheel is speeded direct from the line shaft, which is short and runs as a countershaft. The emery and buffer are used almost constantly on a general line of plow work. These gentlemen state that with their $2\frac{1}{2}$ -horsepower gasoline engine, they produce a better class of work and about twice as much in a day as they were able to do with a 3-horsepower steam rig, and at a great deal less expense. They also say that the engine did eight months of shop work on twenty-five gallons of twenty-cent gasoline, or at a cost of five dollars.

Sharpening and Tempering Mill Picks.

L. A. STANNERT.

The following item will be found very useful to any man who has coal picks to sharpen or temper. The method explained will make them as hard as a diamond on the point. A coal pick

sharpened like a needle is not effective. The point should be of a small square section, being flattened out at the extreme end, so that it will not stick in the coal when driven. The harder the point, of course, the better it will cut.

Pour turpentine into a tin pan until it is about an eighth of an inch deep. After hardening the point, place it straight up and down in the turpentine and hold it until it is chilled. Then dip the pick in water to cool it off, and do not allow the temper to run. This will give a small, hard shell on the very point, and the pick will do good service. I have seen picks tempered in this way last four times as long as others. I think the process would be well worth trying, to any one who has this kind of work to do.

Practical Time-Saving Results of Machine Work.

Even where the profit on articles is very small, it is today found more advantageous to do by machinery as much of the work on them as is possible. It is even cheaper in the long run to perform certain "unnecessary" operations by machine in order to make the subsequent processes easier. The reason of this is found in the great efficiency of modern machine tools. In certain lines, these tools have revolutionized manufacturing methods, and new tools are being devised every day for saving labor and cheapening production.

A Novel Safety Pole Tip.

The half tone engraving shown on this page illustrates a neat safety pole tip, which has features that almost every horseman will appreciate. This safety tip has been recently placed upon the market by the Covert's Saddlery Works, Farmer, New York, the manufacturers, and is guaranteed by them to keep the pole to the neck yoke center



A NOVEL SAFETY POLE TIP.

until the safety hook is thrown back. A concealed spring holds the hook in position when either open or closed. It is finished by the manufacturers in japan, silver, nickel, oroid and gold plate, and is not only convenient and ornamental, but costs little more than the common tip which is usually supplied.

The Ancient Anvil.*

EDNA MANNERS.

To the sound of pick and blasting and the
 splash of mountain streams,
 Where the old black rocks show rusty in
 out-cropping iron seams,
 It has come at man's compelling with ful-
 filling of his dreams.

To the soulless giant crushing with the
 whirr of giant wings,
 To the hell-like furnace fury that destroys
 all meaner things,
 It has yielded. To man's genius its native
 wealth it brings.

To the ringing clang of hammers and the
 discipline of blows,
 Its destiny was shaped by man, as at its
 side arose
 Smith after smith, each welding home his
 life's deep hopes and woes.

They passed, and still its iron heart and
 ancient iron face
 Keep record of those hopes and woes that
 time cannot efface—
 A monument primæval of man's transi-
 tory race.

*Written expressly for the February issue of
 THE AMERICAN BLACKSMITH



Success to the smith.

A leaky bellows means lost work.

Let your work speak for you. And the
 louder it shouts, the better.

Forty blacksmith fires are to be put in
 by the Great Northern Railway Line, St.
 Paul, Minnesota.

Has the winter been prosperous with
 you? Good times, ready cash, shop full
 of custom? Keep it up!

The brightest fire, the best work and
 the widest reputation,—these things and
 the smartest smith go together. Is he you?

Do you encourage the apprentice to
 read the literature relating to his craft?
 Now is the time for him to begin and he
 will thank you in years to come.

Know as much as you can, but don't
 "know it all." A man may keep on
 learning about a given subject, even if he
 knows more than anyone else about it.

Have you thought anything at all
 about Spring, and the line of work it will
 bring you? Will you be prepared for it—
 old tools put into shape, new tools and
 supplies ordered in ample time?

A neat little folder just issued by THE
 AMERICAN BLACKSMITH Company tells of
 the inducements offered to secure new
 subscribers to the paper. Cheerfully sent
 on application to those interested.

He is strong who is foresighted. How
 many times during the year is your shop
 over-crowded with work? Often enough
 for you to add an apprentice? Won't odd
 jobs between rush days keep him going?

Enthusiasm—there's nothing like it
 and nothing more catching. Be enthusi-
 astic in your work and about your work—
 you will surprise yourself. Like faith, it
 will move mountains, and do it more
 quickly, too.

It is said that attention, application,
 accuracy, method, punctuality and de-
 spatch are the principal qualities for an
 efficient conduct of business of any sort.
 Is the blacksmith left out of this? We
 think not.

Going to try for the prize we are offer-
 ing—a \$50.00 scholarship in the Interna-
 tional Correspondence Schools of Scrant-
 on, Pa.? Send your name and address at
 once to THE AMERICAN BLACKSMITH, and
 get further particulars.

The best craftsman is not necessarily
 he who works hardest, but he who works
 most intelligently. Much drudgery can
 be done away with by modern tools. A
 man is to be blamed if he toils like a slave
 over work which he can do quicker and
 better by improved methods.

To spread knowledge is an excellent
 thing. Through these columns the wide-
 awake smith may teach his fellow-crafts-
 men the lessons which experience has
 taught him. He can thus be of consid-
 erable service to his craft. No two persons
 approach or solve difficulties in exactly
 the same way.

Advertise yourself. To succeed in
 these days of great competition, one must
 push himself and his business forward.
 Think over some of the many ways of
 keeping your name before the people whose
 trade you desire,—as printer's ink, good
 fellowship, wayside signboards, good
 workmanship. Adopt such as will aid
 you.

A smith who finds that he has a con-
 siderable amount of any one kind of work
 to do, can very often by a little thought
 and ingenuity get up some tool or jig or
 die to do the work with far greater ease,
 rapidity and accuracy. This is an age of
 thought and improvement, and in the
 smith's trade, as in every other, the man
 who advances fastest is the one who uses
 his head.

If the price of shop materials rises and
 the cost of living also increases, the black-
 smith or other craftsman, whose income
 does not go up proportionately, is in real-
 ity receiving a lesser return from an equal
 amount of labor. There are few localities
 where blacksmithing and horseshoeing
 command an adequate return in these
 days of prosperity and high prices. What
 is your solution of this problem? Let us
 have your opinion.

The successful business man takes pride
 in knowing where to buy to best advan-
 tage. Perhaps some of "our folks" have
 been buying supplies too long in one place,
 and do not keep in touch with the market.
 Before adding a tool to the shop, get the
 leading manufacturers' catalogues and
 study them. Your judgment will deter-
 mine what means the most money for you.
 Too often the dealer's sole viewpoint is
 the largest margin of profit for himself.

Duty to subscribers is the first law in
 this office. Hundreds of dollars worth of
 advertising have been declined because we
 honestly believed "our folks" would suffer
 if it were inserted. But it is a good rule,
 and always means more subscribers and
 more confidence from them. When a
 journal follows this rule, reputable adver-
 tisers are glad to go into its columns at
 any cost. This journal never has the
 thought of making a dollar at the risk of
 its reputation.

It would seem from recent statistics
 that a number of women are actually
 working at the blacksmithing trade all
 over the Union. They must know more
 about it than did a certain young woman
 who lived in an out-of-the-way place in the
 West. She had a horse to be shod and had
 to ride ten miles to the nearest town to
 have it done. She departed in the morning
 in high spirits, never stopping to ask
 questions. But alas! in the evening she
 returned, tired out, and ready to cry with
 disappointment, announcing that she had
 hunted the town through for a "shoe-
 maker's" sign, but had found none.

A bull in a china-shop is an old story,
 but "A horse in a parlor" is surely some-
 thing new. Nevertheless, that is what it
 amounts to. A contemporary describes a
 very up-to-date horseshoeing establish-
 ment in one of our large cities, which is
 called, not a "Smithy," but a "Horse-
 Shoeing Parlor." The equipment is very
 gorgeous,—offices carpeted and hung with
 pictures, white-washed forges placed upon
 polished, hardwood floors and all the rest
 in keeping, while the smith, or "prop-
 rietor" dresses like a banker and draws
 an annual income of \$15,000. This seems
 to indicate that the horseshoer's calling is
 "looking up."

No, indeed, quoth Tom Tardy, when
 asked if he was in favor of lien laws, and
 also qualifications for horseshoers. In
 this whole county, he declared, he did not
 believe there was one qualified blacksmith.
 Moreover, he reasoned, that as far as
 examinations go, a girl may easily learn
 by heart all there is to know about the
 trade and answer certain fixed questions,
 but she could not begin to shoe a horse.
 On the other hand, he said, he himself
 knew nothing of the science of horse-
 shoeing, but he considered himself a first-
 class horseshoer. This is all very true,
 as far as it goes. He did not weigh the
 fact that, supposing he could do good
 work knowing nothing of the real princi-
 ples of it, he would do much better know-
 ing all about what he was at. The truth in
 a nutshell is, that theory and practice must
 go together. A doctor must take a practi-
 cal course of training after he has finished
 his study of medicine. Nobody with any
 common reason would trust his life to the
 quack who pretended that years of ex-
 perience without study had fitted him to
 practice the medical profession.

Tom Tardy will never know just how
 many horses he has injured and sent to
 early bone-heaps because of his ignorance.
 He may make a neat appearing job, but
 why have so many horses shod by him
 become lame without cause, so far as he
 or their owners were able to find out?

The American Association of Blacksmiths and Horseshoers.

The aims of the above named Association have been described in these columns before, so that it is thought necessary only to mention them here. They are in brief, the adoption of uniform county price schedules to give the smith adequate payment for his work, and passage of Lien Laws by the State Legislatures which will make it possible for the smith to secure prompt and sure payment for his labor.

Two meetings were held during January by the blacksmiths, horseshoers and wheelwrights of Erie County, New York, exclusive of the City of Buffalo, the offices of the THE AMERICAN BLACKSMITH Company being placed at their disposal. Both meetings were well attended in spite of unfavorable weather conditions, and both were equally enthusiastic. At the second meeting, the Erie County Association of Blacksmiths and Horseshoers was organized, a constitution and by-laws adopted, and officers elected.

The Association was unanimously in favor of an advance in prices, and a spirited discussion followed upon the amount of the advance. A vote was taken to determine the sentiment of the meeting, but it was decided advisable to hold over the final adoption of prices until the next meeting. Organization in this County has been secured and perfected by the representatives of the American Association of Blacksmiths and Horseshoers, having its headquarters at 453 Washington Street, Buffalo, N. Y. From the work which has already been done, it is more than safe to predict that Erie County will be enrolled almost to a man and complete prices adopted in a very short time.

The movement under foot, as carried out by the Association and championed by THE AMERICAN BLACKSMITH, is meeting with an enthusiastic reception on every hand. Success seems certain, if we can judge by the reception of our representatives and by the communications upon the subject pouring in from all over the country. And no wonder! It is high time the blacksmith fraternity was improving its material welfare, and if it does not take the necessary steps, surely no one else will. The American Association of Blacksmiths and Horseshoers has been formed for the sole purpose of aiding the craft to take these much needed steps in advance.

In this connection, the following letter, under date of December 22nd, from

Mr. E. A. Cornell, of Canton, N. Y., will be of interest. St. Lawrence is the largest county in the State.

"I was much interested in your article in the December number regarding a blacksmith's association, as it refers to the work we have been doing for the past month.

"We have already organized a St. Lawrence County Horseshoers' Association and have enrolled as members about one fourth of the master shoers of the County, which I consider a very good start, as the Association has only been organized about three weeks. At our last meeting, we appointed a committee of six of our best men to canvass the entire County and interest the shoers in the work of the Association. I think by April first, our membership will include at least three fourths of the shoers in the County.

"The object of the Association is to promote concert of action among the members relative to reforming the present methods of competing for work, and in adopting a uniform scale of prices. It is also the object of the Association to eliminate from our ranks all incompetent workmen, who bring discredit upon our trade and do much injury to our patrons. To assist and encourage each other in business necessitates ever being actuated by the peculiarities of brotherhood, which bind us together in a common cause to enjoy the advantages of mutual improvement, and aim to elevate the craft generally.

"The following officers were elected:

"Mr. F. A. Cassada, of Potsdam, president; Mr. I. Cornell, of Canton, vice-president; Mr. E. A. Cornell, of Canton, secretary and treasurer; N. S. Seaver, of Norwood, Wm. Keenan, of Madrid, Anson Butler, of Morley, A. B. VanDyke, of Rensselaer Falls, and David Gilmore, of DeKalb Junction, directors.

"The following price list was adopted:

"New Shoes, No. 5 and smaller, \$1.25 per set; New Shoes, No. 6 and larger, \$1.50 per set; Flat Bar Shoes, same as Open Shoes up to No. 6, No. 6 and over, \$1.00 per pair; Calked Bar Shoes, No. 5 and under, \$1.00 per pair; Calked Bar Shoes, No. 6 and over, \$1.50 per pair; Cold Setting, 50 cents per set; Setting and drawing up calks, 60 cents per set; Setting and Toeing, 80 cents per set; Plain hand-made Shoes, \$2.00 per set; Hand-made Bar Shoes, 75 cents each; Resetting on Track Horses, 75 cents per set; Single Shoe, No. 5 and under, 35 cents; Single Shoe, No. 6 and over, 40 cents; Putting on Pads, 25 cents in

addition to price of shoeing; Machine-made Toe Weight and Side Weight Shoes, 75 cents a pair.

"This is a slight advance over the former prices. There have within the last three years been advances in iron and steel goods, including horseshoes from 40 to 45%. And this alone, to say nothing of the advanced price of living, would be sufficient cause for the slight advance in the price of shoeing."

A New Tool Steel and Details as to its Treatment.

One of the latest things in tool steels is the product of the Ternitzer Stahl and Eisenwerke von Schoeller & Co., of Ternitz and Vienna, Austria, as we are informed by the International Steel & Machinery Co., of 245 Centre Street, New York, N. Y., which company is placing this steel on the market.

There are ten grades of these tool steels, each adapted to a different variety of work, the chief of which bears the name of "Express." This is made of styrian ore, and is adapted to rapid work, having the qualities of tenacity, cutting, durability and efficiency. It is claimed, in fact, to be an almost ideal tool steel. Numerous tests at the works have shown that tools made of Express steel can take a cut of $1\frac{1}{2}$ inches, with a feed of over $\frac{1}{4}$ inch and a velocity of over 175 feet per minute. These figures demonstrate that with machines of but ordinary capacity, the depth of cut, the feed and the velocity are limited by the construction of the machine only. On special machines, however, constructed to withstand a heavy strain, full advantage can be taken of the enormous durability of the cutting quality of Schoeller-Express tools, and results have been achieved which surpass normal attainments from three to five times. These results of course are obtained on machines with an admissible strain far above the work accomplished, thus avoiding vibration, which would damage any kind of steel.

The most valuable quality in a tool steel is its cutting durability, as thereby, other conditions being equal, the efficiency of the tool and the machine are not only increased in direct ratio, but the cost of production is reduced. The following figures are submitted as showing the capabilities of the cutting steel in working homogeneous iron and steel. In each case, a cut $\frac{1}{2}$ inch deep was taken, and the tool neither ground nor cooled. The actual working time on an iron shaft was 36 hours and 27 minutes, with a cutting velocity of 21 to 33 $\frac{1}{2}$

feet per minute, the total weight of shavings being 3,461 pounds. The steel shaft had a cutting velocity of 24 to 33 feet per minute during the working time of 34 hours and 26 minutes. In this period, 91 to 117 pounds of shavings were removed per hour, amounting in the aggregate to 3,448 pounds.

Schoeller & Co. claim that in their department for the production of turned shafting, the capacity has been much increased by the introduction of "Express" steel, and that tools when cutting steel would last from 18 to 20 hours before regrinding.

The treatment of this steel is claimed to be extremely simple. To cut off a piece, the bar should be gradually heated to a cherry-red and cut off with a chisel. If the steel is annealed, pieces can be cut off cold, with a chisel or cold saw, or turned off in a lathe. Further heating of the piece should always be done gradually and uniformly, either on a forge or a charcoal fire. The steel is readily worked at a heat varying from a light red to a cherry-red, and after forging, the tool should be cooled off slowly. Before hardening, the cutting edge should be ground off, to remove the scale. The hardening heat depends upon the work to be done and should be from a cherry-red to a white heat, according to the hardness of the material to be cut. The hardening is done by cooling the cutting edge more or less rapidly, that is to say, the harder the edge is required, the quicker the tool has to be cooled. In ordinary cases it is sufficient to let the tool be cooled off in the atmosphere, but where the utmost degree of hardness is essential, the tool should be brought to white heat and cooled off in a blast.

Midwinter Reflections.

After the first six weeks or so of novelty, as it were, during which the accumulated repairs from last spring have poured in and been disposed of, the winter is bound to fall flat. It is not yet time to begin to prepare for

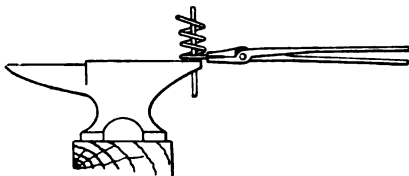


Fig. 1. STRAIGHTENING A COIL SPRING.

spring, so the spring implements and vehicles lie away to be rushed in for repairs just as the winter ones were. This dullness of midwinter is felt in almost every branch of trade or business.

The days are still short, and the smith must get up by candle light, and work until after sundown if he means to make anything. However, the winter has its advantages, even dull February. What about those bright crisp days when the ring of the horses' hoofs and

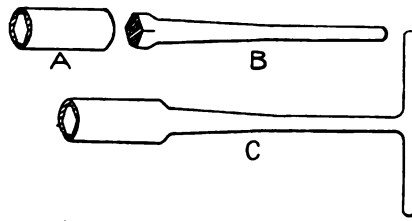


Fig. 2. A HOME-MADE SOCKET WRENCH.

the sleighbells seem frozen into the very air; when loads of red-nosed, red-cheeked neighbors, bundled warm to the eyes, pull up to have their horses sharpened or a whiffle-tree mended? Busy times! The long evenings, too, afford an opportunity for extending friendly and neighborly relations, in the shape of social gatherings, spreading the smith's reputation and popularity.

Last, but not least, for those who wish to push ahead and make a science of their craft, the winter presents unlimited opportunity. In the larger towns and cities, the night schools place a training within easy reach; while for any smith, in country or city, the Correspondence Schools offer good, solid courses. Then, between whiles, in the minutes that might be spent in idleness or grumbling, the smith may read his trade journals and literature, and think about them a bit. Thus he will have laid up ideas that will come handy in the days when it is almost too hot to think.

After all, February is a short month, and the days are gradually lengthening out. The philosopher, looking beyond old Lion March, can already see the spring.

A Few Useful Shop Notes.

BY C. C. H.

To straighten out a coil spring, heat it to a red heat, place it on a rod or bolt in the hardy of the anvil, and pull it out straight by one end.

A piece of $\frac{1}{2}$ -inch round steel drawn down to $\frac{3}{8}$ inches thick and $\frac{1}{4}$ wide, will save lots of time in making wedges for buggy spokes. This may be made larger for large sizes of tenons. Drive it into the end of the spoke, and push the wood of the tennon in. This forms a wedge which cannot be beaten.

Do any smiths have trouble getting guards off a mowing machine? If so, they can save time by making a $\frac{7}{8}$

or $\frac{1}{2}$ -inch socket wrench, such as indicated at A, Fig. 2. I also show two forms of very handy wrenches which can be made of any size and length, as desired.

Any one can make an end wrench, but there are many different ways of doing it. I recently had a hexagonal wrench to make for a four-inch nut, six inches deep. The way I went about it was to form a hexagonal ring, A, Fig. 3, and then a shank, B, welding these two pieces together. By jumping on a handle the wrench was completed.

A Youthful Craftsman's Experience with a Gas Engine.

JOHN SCHAFFER.

I have a 6-horsepower White gasoline engine (which is a little too large for a common repair shop), and I run it at about 220 revolutions per minute. I run my grindstone and disc sharpener from the same pulley and I have a $3\frac{1}{2}$ -inch pulley on the shaft, a $4\frac{1}{2}$ -inch pulley on the grindstone and an 8-inch pulley on my disc sharpener, with a 3-inch belt. I run my circular saw with a 24-inch pulley on the shaft and the same on the drill. I use wooden split pulleys which do very well. With regard to a gasoline engine, I must say that it is one of the best investments a man can make in a blacksmith and repair shop. An engine is always ready

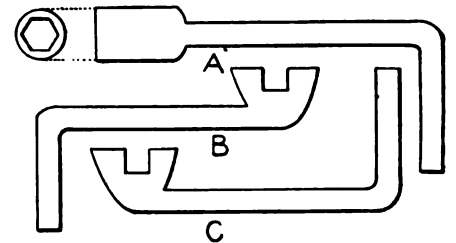


Fig. 3. A NOVEL AND SIMPLE WAY OF MAKING AN END WRENCH.

to work, and it takes only a minute to start them. They do not cost very much; and, as I am only seventeen years old and have run one for three years, I may say that they are very easy to operate, after you understand them. At first, I did not know anything about them, and I had some trouble, but now I have no trouble at all. Some blacksmiths think they are dear. So they are; but they will pay for themselves in two or three years. They do not cost much to run, and, when they are not working, they do not cost anything. There are no grates to burn out, no flues to leak, and no smoke-stack to rust to pieces; no clinkers and ashes to carry out and no wet and dirty floor, as with steam engines. I have used a tread-power, but I would not trade my engine

for ten tread-powers. They are horse killers; besides, you have the trouble of looking after a horse and the expense of his keep.

I run my engine with a battery altogether. I have used the same battery for three years, and it is good yet. I keep it a little warm in the winter. The water tank is something that has to be taken care of in cold weather, as well as the water jacket. In winter, I close the valves in my tank, and let the water out of the pipes and cylinder jacket, below the cylinder. I take away my big tank, which holds five barrels, and put a barrel in its place. When it is very cold, I can warm the water in about an hour. If I cover it, it keeps warm for one or two days and will not freeze. The cost of oil is not very much. I use about five gallons a year.

Diseases of the Foot and Their Treatment.—13.

E. MAYHEW MICHENER, V. M. D.

Ringbone.

By the above common name is known that diseased condition of the first and second digital bones, situated between the fetlock joint above and the third digital bone which is contained within the hoof. The disease is characterized at some period of its duration by appreciable enlargement of the surface of the bone, or bones, involved. The enlargement commonly encircles the digit more or less completely, hence the common name given the condition.

Like other diseases of the bone and its covering, ringbone is the result of an inflamed condition of the parts involved. The location of the primary inflammation differs in various cases; for example, the periosteum, or covering of the bone, may be inflamed as the result of blows or by violent traction upon the various tendons and ligaments of the part. In other cases the first injury is to the articular surfaces of the joints between the first and second or the second and third bones of the digit. In certain cases, the two varieties of cause are operative in the same case. The symptoms of ringbone are, as a rule, positive enough to enable the experienced examiner to determine whether the disease is one of the periosteum alone, whether the insertion of the ligaments is involved, or whether the articular or bearing surfaces of the joint be diseased. The location of ringbone caused by direct blows depends entirely upon the location of the injury, and may thus be located at any part of

the first and second digit, frequently from some injury as, for example, such as caused by a tread inflicted by the opposite foot of the animal, or from its mate in the team. Persistent lameness is rarely caused by injury of this kind, and the enlargement may gradually disappear. When, however, the cause is due to injury of the attachments of the ligaments, the enlargement rarely encircles the bone, but appears as prominences upon one or both sides of the digit. The enlargement may be seen by standing directly in front of the animal, and may be detected by the touch by stroking the digit from above to below between the thumb and forefinger.

When the trouble is divided between the second and third digital bones, the enlargement is partly contained within the hoof, and shows itself as a rounded prominence of the coronet. Lameness is generally present to greater or less degree during some period of the existence of this form of ringbone. The lameness is noticed at the exact moment the foot touches the ground in traveling, and generally becomes more severe with exercise or work. Prolonged rest commonly results in a diminution of the lameness during that period, to return again with work. Lameness is commonly rendered more noticeable by turning the animal in a small circle, when, if one leg only is diseased, the lameness is more noticeable when the animal is turned toward the diseased side.

In the form of ringbone originating from inflammation of the articular surface of the joint, the enlargement takes the form of a ring, or prominence encircling the bone, and may be detected by touch on sides and front of the bone, but not commonly behind the digit, where it is covered by the passage of the large flexor tendons. The most common location is on the second bone of the digit, and hence the prominence is noticeable at the coronet. The best position to view this form of ringbone is directly to the side of the limb.

Certain cases show the ring of enlargement upon the lower third of the first digital bone. These are sometimes called high ringbone, in contradistinction to that form in which the enlargement is around the second digital bone, when it is known as low ringbone. The lameness of low articular ringbone is generally severe, and is by far the most persistent and difficult to remedy. Exercise or work generally causes an increase in the severity of the lameness.

The enlargement in ringbone is caused by a deposit of lime salts in the periosteum, or covering of the bone, as well as in the ligaments of the joints involved. The deposit may progress to such extent as to limit the movement of the joint to greater or less degree, or even to entirely obliterate it, by causing the two bones to unite in one solid mass. Defective movement of the joint may be detected by raising the foot and attempting to move it at its diseased joint. As a result of such extensive changes to the parts, the stride of the animal is shortened, the digits acquire a perpendicular position, and the muscles of the shoulder may waste away on account of the limited amount of use they are called upon to perform in extending the limb.

Causes of Ringbone.

Direct blows, as before mentioned, may be a cause, but commonly only the most unimportant cases are produced by such cause. Faulty conformation is certainly an important predisposing cause. Fetlocks that are too slanting are predisposed, caused by over amount of tension upon the ligaments of the joints involved, as in such cases the line of weight is placed too far back of its base of support. The front limbs are more liable to ringbone than the hind ones, on account of the greater load of body weight sustained by the front extremities. In that conformation in which the toes are turned either inwardly or outwardly, a disproportionate amount is thrown on either the inner or outer half of the joint, and also unequal weight falls upon the inner or outer side of the articulation. Abnormally straight fetlocks are predisposed to articular ringbone, on account of the weight blow falling directly upon the bony surfaces of the joint, for in such conformation the impact of the weight is not properly divided among the bones and the more elastic structures of the tendons and ligaments, which in a perfect limb all receive due proportion. Neglected feet in which the weight is improperly distributed is certainly a prominent cause. Many colts are damaged to greater or less extent by simple neglect of proper care for the growing hoof. Unequal paring of the hoof is also a cause. If one side of the hoof is allowed to be higher than the other, clearly the distribution of weight must be unequal. Allowing the shoe to remain on too long, and the consequent deformity of the hoof, is a common cause among farm horses during the winter months. Severe strain, as from

work on irregular footing, is sometimes a cause. The wedging of the foot or shoe in car tracks is not a rare cause of ringbone in city horses.

Treatment.

The results of treatment of ringbone are frequently difficult to foretell. In cases where the enlargement is confined to the first digital bone, the chances are better than when the second digit is involved. In the articular form the animal never becomes sound, but may become serviceable for certain kinds of



Fig. 1. FOLDING WAGON BOX. CONSTRUCTION OF THE FLOOR.

work. The size of the enlargement may not be in direct proportion to the gravity of the case, but, as a rule, enlargements of the front of the joint are far more serious than of the sides of the articulation. Where the angle of the fetlock is altered, recovery from lameness is extremely doubtful. Bad conformation renders recovery less certain. The treatment consists in removing the cause, if such be possible. Careful balancing of the foot is of the greatest importance in all cases. If the fetlock be slanting, the toes should be shortened, or the heel raised, or both. Generally the hoof is best left unshod during treatment, but some cases may require a thick-heeled shoe. The application of blisters composed of cantharides ointment, eight parts, to the red iodide of mercury, one part, is useful. The blistering should be repeated once every two weeks for a period of from one to two months, or longer. Deep firing with thin platinum or iron points is one of the most useful forms of treatment, but the operation requires a knowledge of the minute anatomy of the parts, as penetration of the joint in firing may be fatal. The firing should be deep, and the points of the instrument should penetrate the surface of the diseased bone. When firing and prolonged rest fail to render the animal serviceable, the one remaining form of treatment consists in dividing the digital nerves. This operation is frequently successful, provided the movement of

the joint is not limited by the amount of ringbone deposit. Not unfrequently, complications following section of the nerves cause degeneration of the foot, which necessitates the destruction of the animal. Animals showing ringbone should not be used for breeding purposes, especially if the conformation be defective.

(To be continued.)

A Novel Folding Wagon Box.

A new contrivance has lately been placed on the market, in the shape of a folding farm wagon box. Every farmer, more or less frequently wishes to remove his wagon box from the running-gear. With the old style box, this is a heavy lift for at least two men, depending on the size of the bed, on account of its weight, cumbersome shape and liability to bind between the standards of the bolsters in wet weather. The folding box as manufactured by the Folding Wagon-Box Company, of Haverhill, Ohio, is built in separable sections so that a boy old enough to drive a



Fig. 2. THE SIDE BOARDS—METHOD OF FASTENING.

team can easily and quickly put it on or off the running-gear anywhere, without tools. The claims of the makers are as follows:

It cannot bind between the bolster standards when being removed from the running-gear in wet weather. It occupies less than one-tenth the storage space of the old style box when not in use. It is more durable than the old-style box, because it can not be wrecked or broken in handling as is the old style box.

The floor is built in two separate pieces that meet in the center with a tight ship-lap joint. The lugs that extend along the floor are firmly secured to the ends of each cross-bar and prevent either floor or side boards spreading, thus insuring a perfectly tight box. A neatly braced side step serves the usual purpose of step and brace to side boards. The end gates complete the box, making a rigid, durable farm wagon

box. In removing the box from the running-gear, the ends are first taken out. The side boards next infold and the bottom is taken out last.

Fig. 1 shows the construction of the floor of the box. It is made in two sections, length-wise. The cross-bars extend the full width of the floor as in the old style box. Fig. 2 shows the construction of the side boards and the manner in which they are secured to the floor. Hooks on the side boards pass under the end of the cross-bars and bind the floor and side boards firmly together when the side board is raised vertically. Fig. 3 represents the box complete.

The patterns and dimensions of all woodwork are the same as commonly used in wagon boxes. A set of special irons is all that is necessary to enable any wagonmaker with the usual tools and dimension work to turn out the folding box easily and cheaply in his own shop.

All these points of excellence claimed by the manufacturers must go to recommend the new box to the farmer who is in search of improved methods. Actual test is the only proof of the merits of a new article.

The box is made in both the standard widths, narrow tread, three feet, two inches and wide tread, three feet, six inches. All boxes are ten feet six inches long outside—with the boot, they are eleven feet, six inches.

Report on Flue Welding.*

T. J. RIGGS.

Among the many features connected with economical shop management, there



Fig. 3. THE FOLDING WAGON BOX COMPLETE.

is no more deserving of close study than the best method of welding flues.

The first to be considered in this line is the formation of the joints. This may be done by the lap weld, the butt weld, or the scarf weld. The butt weld, we will not discuss, as I believe it has passed into disuse. The lap weld in which the tube is enlarged sufficiently

* Read before the Chicago N. R. M. B. A. Convention.

to admit the other end, which has not been previously scarfed down, is in my opinion not a proper form of weld. And the two objections, which I will mention, seem to me to overbalance any good points connected with it.

First: The tube being enlarged sufficiently to be shoved over the safe end, the belt of the metal is thereby merely doubled. The result is that when it is subject to the pressure of the rollers, the excess metal will form a ridge on

with the other. Another point in this weld is the clean joint which is formed, there being no chance for dirt or grease, as this is entirely cleaned off by the reamers.

The machine used by us at the Buffalo shop, enables us to both weld and swedge down the end for the flue sheet on the same heat.

The method fully described above seems, all things considered, to have more advantages than any other. The

results obtained by following it are both practical and satisfactory in all cases.

The Scientific Principles of Horse-shoeing.—16.

E. W. PERRIN.

Contraction of the Hoof and Foot.

Contraction of the hoof, and in serious cases of the foot also, is, as its name implies, a shrunken condition of the parts, which usually affects the front feet.

It is also formed in the hind feet to a limited extent, but it rarely causes lameness in them.

Contraction may be very slight, or it may be so serious as to cause structural changes in the foot as well as the hoof. Figs. 83 and 84 are typical cases, the result of long years of neglect. Fig.

84 shows the foot out of the hoof—observe the narrow dimensions of the heels, and the cramped condition of the sensitive frog. Of street horses 75 per cent. are affected with contraction in some of its various stages of development. We have contraction of the heels and frog—the most common—contraction of the quarters, contraction of the sole, and sometimes contraction of one heel and quarter, producing a condition commonly known as “wry hoof.”

An early symptom of contraction, before any marked change in the dimensions of the hoof is perceptible, is a dry, hard condition of sole and frog, with some rise of temperature and soreness, as evinced by concussion with a shoeing hammer. If this condition, which is the incipient stage of the disease, be

not promptly relieved, the hoof begins to shrink, the median and lateral lacunae—which in a healthy hoof are wide—get narrow and deep, and the points of the heels turn in on the frog, slowly crowding it out of existence; atrophy sets in; it wastes away, and as the frog diminishes in size, the heels close in upon it, slowly producing the condition seen in Fig. 83. If there is much contraction, corns will be present also; thrush in the frog usually accompanies contraction; in fact, contraction is the forerunner of many other diseases of the foot.

In a healthy foot, the heels are somewhat wider at the ground surface than at the coronet, while in a badly contracted foot the very opposite is the case. The horse with contracted feet, if not actually lame, will have lost the elasticity of step and freedom of movement. He steps short and is very prone to stumble. He hobbles along.

The most prolific causes of contraction are: Want of moisture; concussion resulting from fast work on hard roads; want of frog pressure; thinning the sole and rasping the outer wall; leaving the shoes on too long, thereby allowing the hoofs to grow abnormally long; the use of seated shoes; unlevel hoofs; improperly fitted shoes, and neglect of the hoofs in colthood.

As to treatment, in the early stages of contraction before perceptible change in the dimensions of the hoofs has taken

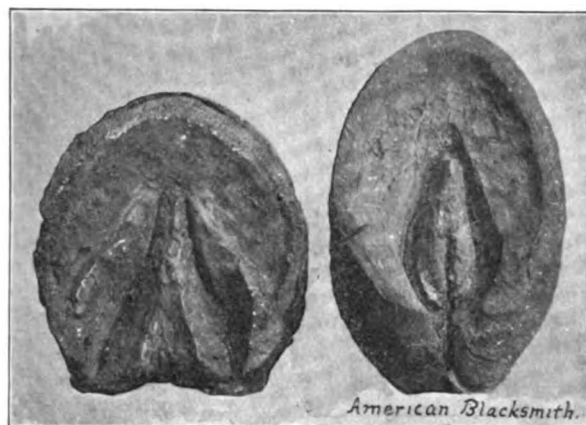


Fig. 82. GROUND SURFACE OF NORMAL HOOF. Fig. 83. VIEW OF CONTRACTED HOOF.

the inside of the tube, thereby reducing the size smaller than its natural calibre. Although this reduction may be from $\frac{1}{8}$ to $\frac{3}{16}$ inch, yet in a whole set of flues, the reduction in size will to an extent affect the draught and render the flue more liable to be plugged or closed.

Secondly: If the flue is expanded by a mandrel, there will yet remain a certain amount of dirt at the joint. This, upon being heated to a welding heat, becomes dross. This dross during the process of welding, if done by the roller, forms into two masses and is deposited just back of the point at which the rollers come into contact with the flue, and as this will not fuse with the metal of the flue, you will have two spots on each which have been welded. This may or may not leak, but they both go to weaken the weld, which in this class of work should be perfect.

I wish now, for a moment, to draw your attention to the scarf weld. By this process we ream out the flue to a distance of $\frac{1}{2}$ an inch. The safe end is accordingly pared down and when placed within the scarfed end of the flue, forms a close and clean joint. Both the outside and the inside of the flue are thereby kept in the same line, and, as the pressure of the weld is brought upon the flue the metal will not upset and form itself into ridges and masses, but will be brought into direct contact

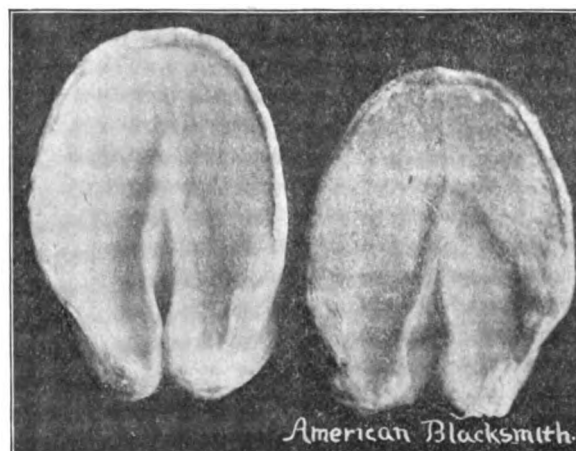


Fig. 84. CONTRACTED FOOT DENUDE OF HORN. Fig. 85. NORMAL FOOT DENUDE OF HORN.

place, poulticing the feet with warm wet bran, or soaking in hot water three or four times a day, or turning the horse out in a wet pasture for a week or so, is usually all that is necessary to restore freedom of movement and comfort in travelling. This of course must be followed by proper shoeing. But whenever change of shape has taken place,

where the hoof is contracted, a course of treatment is necessary to effect a cure. First remove the shoes and reduce the hoofs to normal dimensions, then the hoofs must be softened by poulticing or soaking for three or four days, so as to get the horn soft enough to admit of expansion. When the hoof is thoroughly soft, use a pair of expansion springs (see Fig. 86). To apply the expanders, take a small saw and saw a deep slot at the point of each heel, the same as you would "open up" the heels. You may do this with a shoeing knife, but you can make a much better job with the little saw supplied for that purpose. This slot must be cut down close to the vascular structure, so as to facilitate expansion. Make a small hole on the inside of each

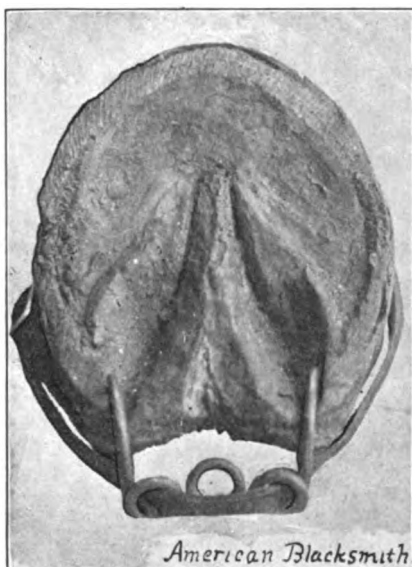


Fig. 86. GROUND VIEW OF HOOF WITH EXPANDER SPRINGS APPLIED.

heel to receive the points of the spring, and take a spring that when released is from $\frac{1}{2}$ to $\frac{3}{4}$ of an inch wider than the hoof. Compress the spring with the tongs supplied for that purpose, insert it in the holes made for its reception, then release the spring and the pressure will retain it in its place. However, a strap is usually attached to the spring and buckled round the coronet to guard against its being lost even if pulled out of the foot. Let it be understood that this expansion process must be done gradually. Therefore much care is necessary in selecting a spring that fits, as too much forcible expansion will be followed by acute pain. All these changes in the hoof must be brought about gradually. You will find it good practice to use the spring first in the morning, and watch the effect. If the animal evinces much discomfort, use a

smaller spring. Take them out at night for the first day or two, after which they may be worn night and day. As soon as the lameness is over, the animal can go back to work wearing the springs, but the feet should be poulticed or soaked every night.

In shoeing, if the frog is sound enough to bear its share of weight, shoe with a bar shoe or rubber pad, so as to obtain frog pressure. If thrush be present, as is often the case, shoe with an open shoe until the frog is healed and grown up strong; the normal pressure should then be restored. Now as the hoof slowly expands, you'll find the springs getting loose, which indicates that a spring one size larger may be used. A hoof badly contracted may need three or four sizes of springs during a course of six months' treatment. After the first month, the hoofs may be kept soft enough by stopping with wet clay regularly every night, but the hoofs must be kept soft, as the expansive treatment is inoperative on a hard, dry hoof; therefore, if in your judgment the hoof is dry, poultice again for a few nights.

There is no question of the effectiveness of this treatment for the cure of contraction, provided these instructions are properly followed. You can expand a hoof a half inch in the first six weeks of treatment. Once the normal dimensions are restored, of course no more expansion must be applied. I need hardly say that in cases such as Figs. 83 and 84—from photographs of foot and hoof in my possession—in which structural alterations have taken place, even in the bones of the foot, the result of long years of gross neglect, that although some improvement may be effected, a cure is impossible.

By the term "wry hoof," is meant a hoof that is contracted on one side only,—usually the inside heel and quarter of a front foot, though occasionally a hind one is similarly affected. The outside grows out wide and shallow, tilting the foot to one side (see Fig. 87). Neglect to reduce the surplus growth on the outside aggravates the trouble, seriously disturbing the pastern and foot. I have seen two cases where the inside wall had turned in and overgrown the frog, so that the animal was actually walking on the inside of the hoof. Neglect of the feet in colthood, causing distortion of the foot and pastern while the bones are yet supple, followed by gross neglect in not keeping the hoofs properly pared, is the cause of wry hoof. The principle of treatment is

practically the same for wry hoof as for other forms of contraction, except in the manner of reducing the hoof to normal dimensions, for which see dotted lines in Figs. 87 and 88. To expand the contracted side of the hoof, draw down a small clip on the inside of the heel of

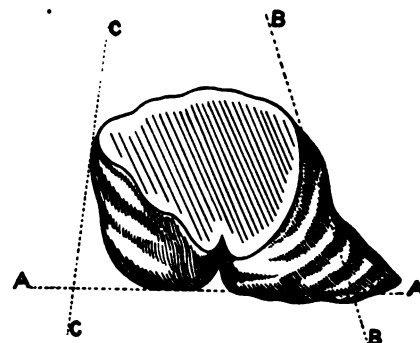


Fig. 87. REAR VIEW OF WRY HOOF. OUTSIDE OF A A AND B B IS SURPLUS HORN. THE CONTRACTED SIDE SHOULD BE EXPANDED TO LINE C C.

the shoe on the sound side of the hoof. This clip is to fit down into the lateral lacunae. Punch a small hole in this clip to carry the point of an expansion spring on that side of the hoof. Insert the point of the spring into the hole in the clip on the one side and into the contracted hoof on the other side. Nail well round to the heel on the sound side of the hoof, but only on the inside toe of the contracted side. The pressure of the spring thus applied will slowly force out the contracted side. If you find the growth of wall is tardy on the contracted side, stimulate the coronet on that side of the hoof only. If the foot and pastern are somewhat distorted—as is generally the case—and

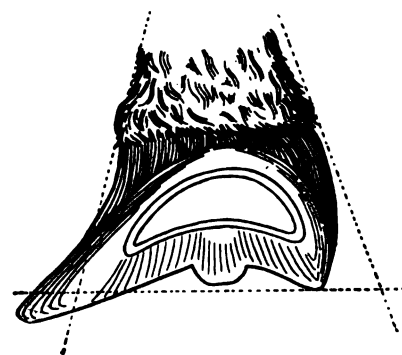


Fig. 88. VERTICAL CROSS SECTION OF WRY HOOF—FRONT VIEW. DOTTED LINES SHOW HOOF TO BE REMOVED AND EXPANSION NECESSARY.

the animal is full grown, the bones and articulations being set in that position, they will remain so; and in such cases the hoof will always grow abnormally wide and long on the one side, while the other side will contract. The only time to obviate this deformity is in colthood. Once the animal is grown, all

you can do is to keep on restoring—almost as possible—the normal dimensions of the hoof at each shoeing, about every three or four weeks, because the abnormal growth of hoof to the one side greatly aggravates the distortion of foot and fetlock.

Where the sole only is contracted, normal conditions may be restored by reducing the hoof to normal dimensions, poulticing for a few days, and following this by the use of bar shoes, a leather sole, and tar and oakum.

(To be continued.)

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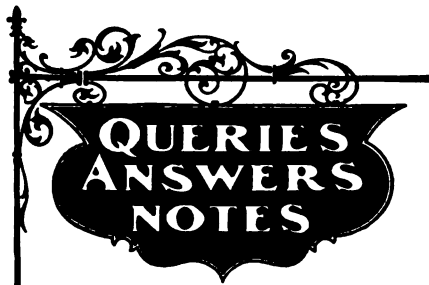
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The following columns are intended for the convenience of all readers for discussions upon blacksmithing, horseshoeing, carriage building and allied topics. Questions, answers and comments are solicited and are always acceptable. For replies by mail, send stamps. Names omitted and addresses supplied upon request.

Corns—I should be very much pleased if some brother smith would give a safe cure for corns on horses' feet.

E. O. BROWN.

How to Temper Gun Springs—Will some brother smith give me a method of tempering gun springs and articles of a similar nature?

W. L. PHILLIPS.

Water Foundered Horse—I would like to know through the columns of THE AMERICAN BLACKSMITH, the best method to shoe a water-foundered horse.

P. H. SENN.

How Sharpen Horse Shoe Rasps?—I should like some brother of the craft to tell me if it is possible to sharpen horse shoe rasps when they get dull, and how?

J. H. L.

A Question on Wagon Tires—I should like to know why it is so difficult to shrink wagon tires so as to stay tight on the wheels, as they are when cut and welded.

G. W. BOOTHE.

Axle Work and Tempering Gun Springs—I should like to know the best rule for setting buggy axles and laying off wooden axles; also the best method of tempering gun springs.

W. HARGUS.

Fastening Spokes and Metal Wheels—Will some brother smith tell me the best method of fastening spokes and metal wheels, which are loose both at the hub and at the tire?

CHAS. SHERMAN.

A Painter's Question—I should like to know how to use chamois skins, pumice stone, water, rubbing stone bricks, etc., so as to best secure a good smooth surface for painting.

C. D. BRIDDELL.

Ring Bone—When shoeing for ring bone on the outside of a horse's foot, I use a very heavy calk and let it run down the middle of the shoe. By tapering the toe of the hoof, I find that much relief to the foot can be secured.

A. G. SMITH.

A Plow Welding Question—I should like some brother smith to tell me how to make a good plow point without burning when taking the welds on the upper parts. What is the best kind of coal to be used, and how should the fire be made for this purpose?

P. G. COLLINS.

Curb—I should like to know if there is any special way to shoe a horse which is a little inclined to be curbed in both legs. He will be three years old in May. I have blistered him but without effecting any improvement, and would like to know if there is any special shoeing which will help.

CHAS. SHERMAN.

Cutting Nuts from Bolts—Regarding the question of Mr. Bruton in the January issue, would say that my experience is that the chisel and hammer is the cheapest and best tool for this purpose, although I have a pair of bolt clippers which are extremely useful in the places where I can use them.

IRA MUNSON.

Oil Furnaces for Brazing—I would like to have some information regarding oil furnaces suitable for brazing. I would like to know how to make such a furnace, or where they can be bought. I am at the side of a large grist mill, and have a large number of castings to repair at the present time.

W. B. WOLF.

Cracking of Steel—If Fred Barney will temper his drills and tools in warm water, keeping the cold air from striking them, as he takes them from the water, he should not have any trouble from temper cracks. If the heat is taken uniformly, the fault usually lies in the cold air and cold water and not in the steel itself.

B. B. MALLORY.

Rubber Tires—Will some one who has had practical experience with rubber tires, please explain the process from start to

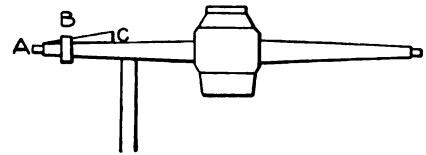
finish? I have a tire shrinker and wonder if it could not be used to shrink the flange tires, with some attachments. What is the best apparatus for tightening the wires, and what method is best for brazing them?

J. H. JENSEN.

Oil Furnaces—Noting an article in the December issue on the oil furnace, I should like to know where I could get information as to how to make such a furnace. I wish to put one in my shop for welding boiler tubes and other work, such as ordinary blacksmithing. I should also like to know whether I could get one which would also be suitable for melting iron.

PETER HANSON.

How Keep a Shoe on? To Draw Old Spokes—Will some good brother tell me how to keep a shoe on a horse? He throws his right front shoe. I have tried different plans on him, but all have failed.



A GOOD METHOD OF DRAWING OLD SPOKES.

To draw old spokes, make three or four bands about $1\frac{1}{2}$ to three inches out of $1\frac{1}{2}$ inch band iron. Slip the band, B, over the spoke, A, then fit a good hickory wedge, C, inside the band next the spoke, and drive on the wedge. I have drawn some very bad spokes in this way.

J. P. WINGARD.

Three Blacksmithing Questions—Is the water tuyere iron the best for general blacksmithing, and if so, how low down should the same be put?

How is a hollow fire built and of what benefit is the same?

How should a piece of round iron be scarfed which is to be jumped on to a piece of flat iron so as to stand perpendicularly on the same?

EDWARD ADAM.

Construction of Small Furnace—I would like very much to hear from any one who has had experience in this line of work, as to how to construct a small furnace to heat springs for the purpose of tempering them. I have to make a lot of springs three feet long, $\frac{3}{8}$ -inch thick and four inches wide, and would like to know about a furnace to temper them. Please help me out.

W. J. YOUNG.

A Tempering Question—We have been tempering gun springs by heating to a red, dipping in water and drawing the temper by reheating. Having been told that there is a way to temper them by simply dipping in a specially prepared solution, we would like some brother to tell us how to make the solution through the columns of THE AMERICAN BLACKSMITH.

LEMMON BROS.

Small Gas Engines—Speaking about a one-horsepower gas engine, the Weber Gas & Gasoline Engine Company, of Kansas City, Mo., states that while such engines may, for ordinary purposes, be large enough, the usual trouble with engines so small is that they are very soon placed on a $1\frac{1}{2}$ -horsepower or larger pull, which is about the same as overloading a horse. The consumption of gasoline by the engines built by this concern, they inform us, is proportional to the pull, and further, that such an engine, while it costs but little more than a one-horsepower engine, can take care of larger loads without any trouble and without the likelihood of wearing them out and sending them to the gas engine bone yard.

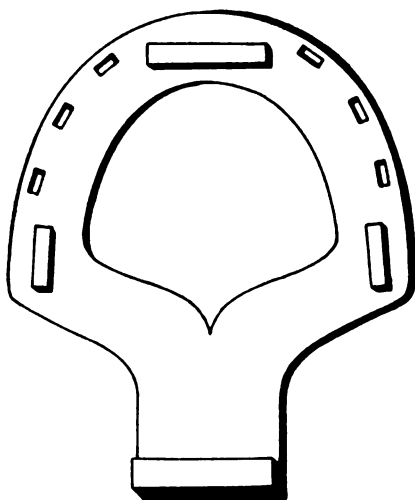
Tempering Mill Picks—In reply to the question of Mr. E. Sager for tempering mill picks, my advice would be to heat the same as you would heat a cold chisel, and dip the pick about one half of an inch deep into a can of mercury until it cools. From my experience this will give the very best results that can be obtained.

I should be very glad as a blacksmith to tell my brother smith anything that I can in the way of tempering tools. E. YOCUM.

To Make Shoes Stay On—In answer to Brother W. H. Hahn's question about the above, I should say in the first place that it is necessary to have a full bearing and to make the shoe fit the foot, but do not rasp the foot down to the shoe. Do not cut a groove to clinch the nail in, and only rasp until smooth. Use the Putnam nail and turn it down instead of twisting it off. They will twist in the foot before twisting out and also you avoid tearing your hands and apron. W. F. REMINGTON.

The Gas Engine in the Shop—I have been noticing a great deal in THE AMERICAN BLACKSMITH about gasoline engines. My experience is that the Canfield Gas Engine made by P. B. Canfield, of Binghantown, N. Y., is an excellent engine for the blacksmith. I have a three-horsepower Canfield engine, and with it in my shop am running an eighteen-inch blower, an iron lathe, a wood lathe, a drill, emery wheel, rip saw and a jointer. By means of another belt, I drive with the engine a saw out-of-doors, which will cut at the rate of from fifty to sixty cords in ten hours. C. HALL, JR.

A Shoe for Corns—I notice on page 58 of the December issue that Mr. J. H. Dietrich claims to have an original form of shoe. I have been using this same kind of shoe for several years myself, although not for the purpose which he does. I use them for a horse which has a quarter cut off on a barb wire and which has grown a false quarter.



A SHOE FOR BADLY CONTRACTED FEET.

I use another shoe which as far as I know is original with me. I use it on badly contracted feet, or feet which have very sore corns; also in cases of navicular joint lameness. I have had very great success with it. The accompanying drawing shows the shoe. The flat piece goes directly over the frog and has the heel turned up on it exactly as on any shoe. It is a splendid shoe if a horse is working on pavements and I would recommend it in such cases. T. R. THOMPSON.

Tempering Mill Picks—If Mr. E. Sager will take one-half ounce of corrosive sublimate, one ounce of sal ammoniac, one hand full of common salt, to one gallon of rain water, he will find this a splendid tempering compound for mill picks. He should use great care in heating his picks to hammer them, and not to get them above a cherry red. After he has hammered them, let them cool off perfectly cold before tempering. When he gets ready to temper, heat the picks to a low cherry red as far up as he wishes to temper, plunge into the solution and leave until cold. Do not draw the temper. Treat the other end of the pick in the same manner. B. B. MALLORY.

Case Hardening—Referring to the method which Mr. Willard Mann gives on page 58 of the December issue for case hardening with prussiate of potash, it seems to me that his method is only skin deep. In my opinion the following is the best known way for case hardening: Pulverize and dissolve in one quart of boiling water, an ounce of blue vitriol, an ounce of borax, an ounce of prussiate of potash, an ounce of charcoal and half a pint of common salt. Add this to one gallon of raw linseed oil. Finish the work to be case hardened for polishing. Heat it to a cherry heat and immerse the piece, stirring the mixture while it is cooling. In this way you can make edge tools out of iron, or cold chisels for cutting soft metals, such as brass, copper, babbitt and soft iron. E. YOCUM.

The Apprentice Question—I enclose money for my next year's subscription, which I consider a dollar well invested, even though I am nearing the day when I shall cease to be in active service. If I could wield the pen to my liking, I would challenge some brother smith to write upon some questions not yet dealt with. For instance, I should like to know how and where we are to get the smiths which will be needed soon. Are we instructing those who are to fill our places? I do not know of one young man in all my acquaintance who is receiving instruction in the craft. A few years ago I had occasional applications from those who claimed to be skilled workmen, but in the past year, I have not had one applicant. This may be due to the prosperous times, but I hardly think so. WM. L. HINMAN.

An Opinion on Power—With regard to power in the shop, two men can take a 2-horsepower gasoline engine and make more money with it than five men can without power.

I have a 3-foot grindstone with which I can grind my tools and make \$200 a year grinding plow points and saws, besides running my band saw, lathes and other machinery. I have a 6½-horsepower boiler and engine. If I were going to use gasoline I should not want it in the room I worked in, as I don't think it is healthy to inhale the fumes from gasoline.

I have my shop on the bank of a small river. I am going to put in a current-wheel and get power from that. Any blacksmith whose shop is near a stream of water can put in a dam and a race, have an undershot wheel and get all the power required at a very small expense, as no fuel at all is needed. W. W. HERRING.

Toe Clipping—In general I am not an advocate of toe clipping and will give my reasons. In fitting the shoe, the farrier usually claps the red hot shoe on the foot, burning in his clip, and also scorching the

sole of the foot, which draws out all the moisture. The floorman tacks it on, hammers the clip into the toe which raises a great deal of mischief to the horn, which in its downward growth, meeting with the resistance which the clip offers, turns inward upon the inside toe, causing pressure and inflammation. From the pressure the bone is absorbed at the toe, often causing seedy toe. In the large cities, the smith thinks it is absolutely necessary to clip for heavy pulling on pavements, but there is too much stress put on this. Some even advocate side clipping also. I simply give it a wide berth, as it is injurious and not necessary, in my opinion. WILLIAM F.

Lehigh University Register—The Register of Lehigh University, South Bethlehem, Pa., just issued, shows an attendance of 581 students, from twenty-seven States and six foreign countries. There are fifty-two in the teaching staff.

Twelve courses of instruction are offered at the University; the Classical Course, the Latin-Scientific Course, courses in Civil, Mechanical, Metallurgical, Mining, Electrical, and Chemical Engineering, Analytical Chemistry, Geology, Physics and Electro-metallurgy.

The following prize scholarships will be open to competition at the annual examinations in June: Two in the Classical Course of \$150 and \$100 each, and one in the Latin-Scientific Course of \$125 annually in addition to free tuition. Provision is made for worthy and needy students, whereby they may postpone payment of tuition until after graduation.

Tempering Mill Picks—In answer to the inquiry of Mr. E. Sager for tempering mill picks, I will give my receipt which has given me satisfaction for the past thirty years. I will first give my plan for drawing bits, as there is as much in this as in tempering. I use charcoal, and heat slowly, never above a high cherry red. When the heat is raised, I first use the fuller on each side about one inch up from the bit. Then I draw my bit down to ¼ by 1½ inches long, and always use plenty of cold water hammering and never upset the end, but cut off with a chisel. For tempering, I use the following: Six gallons of rain water, one and a half pounds of salt, two ounces of sal ammoniac, one and a half ounces of corrosive sublimate, two ounces of alum. Pulverize well and dissolve. If you can get ashes of white ash, add two handfuls. This will take all the scale off and leave a silvery color. I would advise trying this. WILLIAM F.

Removing Broken Bolts—Noting an item on page 59 of the December issue about removing broken bolts from an engine foundation, I will give my way in which this problem may be solved. Mr. Gardner tells us that the bolt is broken about five feet from the bed plate. I would withdraw the part that could be taken off from the top, and as the opening in masonry is two feet by four feet six inches, I would insert a forked wedge between the nut and the washer at the bottom end. Then having forced the bolt down sufficiently to get an alligator wrench between the nut and the washer to hold it, I would take the nut off by means of a wrench to suit the size of the nut. Next, I would put the bolt back up the hole by wedges and short pieces of iron an eighth smaller than the bolt. I hope that I have explained this sufficiently so that it can be understood. I do not think it would be a very difficult operation. GEO. MADDOCKS

Welding Steel Axles—I have seen several ideas given in regard to welding steel axles. I think the best way to weld steel axles is to "V" weld them, that is, to split one end and scarf down in the shape of a V, and then fuller the other end to fit. Heat the split end and close down on the other piece. Then put in fire and heat red hot, bring out and cover with "Cherry Heat." Put back into the fire and take a welding heat, bring out and have helper strike with the sledge and finish up with flatter. If properly done you cannot see the weld. I do not think any more about welding steel axles than I do two pieces of iron. This is also the best way I have ever found for welding large rods of all sizes and kinds. I have welded all sizes from one inch round and square, up to three and one half inches, in just a common repair shop. I have been working at the blacksmith business for thirty-five years and have had a number of experiences of different kinds, having done general work of all kinds. B. B. MALLORY.

Splints—I have been reading an article on page 54 of the December issue about splints on horses' legs and the causes. After a practical experience of over thirty years, I would say that of the many causes of splints which have come under my notice, I could trace almost every one of them to improper leveling of the foot. I have never seen a horse, that has never been shod, with a splint. A great many men do not look on the hind legs for splints, but they are there in my opinion very often, and are very destructive to the usefulness of the horse, for the reason that we do not look for the splint there until the inflammation set up by the action of the splint has resulted in spavin, and the usefulness of the horse is almost at an end.

I have worked for over twelve years on the race and light harness horse without having a splint develop. I have used the foot leveler ever since there was one made. They are very good, but any good track shoe knows that they have lame places in them, which no one as yet has been able to straighten out, though someone probably soon will. T. R. THOMPSON.

A Shoeing Letter—I am a young smith and would like to ask some of my older brother craftsmen how to shoe a horse that cuts his inside quarters. He is a pacer, and is used for track and light road work.

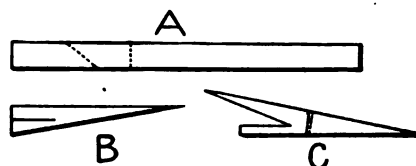
I was much interested in the letter of W. L. G. in the December number, for I thought where I lived was the only place that the "farmer blacksmith," the "can't wait" man, "Old Windy" and "Cheap John" resided, but I see I was mistaken.

Regarding the several items as to how shoes can be made to stay on, it is my opinion that too many of us make the shoe stay on too long. There was a horse brought in my shop to-day which I had shod five months before, and since which time the feet had never been touched. The average farmer will let his horse go as long as the shoe stays on, and yet they complain of their horses not traveling well or of interfering. I believe that a horse ought to be shod every four or five weeks, and that eight weeks is the longest a shoe ought to be left on from the standpoint of the welfare of our good servant, the horse. W. L. P.

Shoeing a Turned-under Foot—In answer to brother W. Trammel, I would say that a turned-under foot should first be cured or straightened, which can easily be done in from fifteen to twenty days. Secure a poulticing boot and use a flaxseed

poultice as hot as your hand can stand. This is to be put on the foot after shoeing the horse with a shoe of the following shape: Cut out a V on the turned-under side one inch from the center of the toe. Turn down clips at the junction of the bars and heel and make a wide web convex shoe. After twelve hours of poulticing, use a screw dilator and expand the shoe until the horse shows just the very first sign of uneasiness, when you should be sure to stop and walk him an hour and a half or so. Then use the poultice again. Repeat this operation the next morning, use the expander once a day, walking him after each treatment. On the crooked side, from the center in front to the heel, apply the following at the coronet, rubbing it well in with the finger: Three ounces of olive oil to one ounce of stronger ammonia. Apply this once a day until well. W. F. REMINGTON.

Plow Lay Points—I have seen that a number of brother smiths inquire about plow lay work, and hence I will give my way of pointing plow points. I use $\frac{3}{8}$ by $1\frac{1}{2}$ -inch lay steel and cut it as shown at A. Having cut it in pieces such as shown at B, I forge it out, split and shape successively as shown at C. The right hand piece is drawn out to fit under the share and the left hand to fit under the bar.



METHOD OF TREATING PLOW POINTS.

Heat, place on the anvil at about the point where the dotted lines are shown, with the bar side to the left, if for a right hand plow. Then bend the prongs down and together until it fits the point. Heat the point, put on the lay, clamp, and it is ready for welding. I use borax, sand and salt for this purpose to start, and finish with anvil dust. I have laid about fifty in this way in the last month at the rate often of from eight to ten a day. My charge for this work is from thirty-five to fifty cents, depending upon the size of the point. A. T. WRIGHT.

A Letter on Shoeing—Horseshoeing is not a trade but a science of a high order, requiring of the man who practices it a thorough and scientific education concerning all the anatomical structures of the foot and limb. It is unreasonable to expect an apprentice to comprehend a subject of such complexity, when he receives his only instruction from his master horseshoer, who in turn has no more anatomical knowledge than the one whom he tries to teach. The great need to-day of the horseshoers of this country, individually and as a body, is a college to secure higher training and skill in the practice of horseshoeing. It seems to me that the horseshoer of to-day is but a repetition of the horseshoer of a hundred years ago, and if proper steps are not taken, the horseshoer of to-morrow will be but a sample of to-day. We have but to look into our streets to find lame horses at every turn. The unbalanced foot is very common, and causes more damage and destroys more horses than all other diseases. Why is it that sound feet are scarcely to be found on any horse, and that perfectly balanced feet are almost as scarce as stars at mid-day.

The owner often asks whether the shoer does not pare his horse's feet too much.

Can anyone pare a horse's foot properly when he does not know where to commence or where to stop? H. N. MUDGE.

Tempering Mill Picks—I notice that some of my brother smiths are asking for a good receipt for tempering mill picks. I will give one which has been in use for a number of years. Take a barrel, set it in the ground near the forge and fill it with well water. Make a brine strong enough to hold up an egg or potato. Take a piece of alum the size of an egg, pulverize one-half of it and add to the brine. Put the other half in a bag and nail it in the inside of the barrel about half way down and let it dissolve at leisure. Cover the barrel and keep it clean.

This however is not all that is required to make a good pick. You must have a good steel and know how to work it. After your pick has been drawn to shape, much care must be taken in heating and hammering. Never upset the steel. Never strike the pick on the edge after hammering on the flat. After you take it from the fire, edge it up, and keep it straight. Each heat should be lighter than the one before it. The last heat, hammer very lightly. Take about three heats to finish it after it has been drawn. Use water all the time when you are hammering, and a great deal of it.

When tempering, heat slowly and do not let the piece scale. Do not draw the temper. The secret is to make the pick as hard as possible, and yet at the same time to have it sufficiently tough. Draw the pick across a window glass, and if it cuts it is all right. I use blacksmith coal when drawing the pick down, and then hammer it off with charcoal. W. G. W. T.

Cure for Contraction—Noticing an inquiry in your paper for a cure for contraction, I will give you my treatment, which in my twenty years' experience has never failed. Much depends upon the smith, although the owner of the horse must perform a certain part in order to cure this disease, unless it has run into ossification of the lateral cartilages, which, if confirmed, is incurable. I will first explain a little of the foot in its normal condition and also some of the causes of this disease.

The frog being placed at and filling the rear part of the foot, assists to a material degree in the expansion of the foot. It is formed internally of two prominences on the sides, and a cleft in the centre, presenting two cavities with a sharp projection in the middle and a gradually rounded one on each side. It is also composed of a substance flexible and elastic. What can be so well adapted for the expansion of the foot when a portion of the weight of the body is thrown on it? How readily these irregular surfaces yield out and return to their natural state! In view of this, therefore, the horny frog is a powerful agent in opening the foot.

One cause of contraction is in the owner's neglect in allowing the foot to get dry and hard, and another is caused from very bad shoeing, bringing the heels of the shoe in too much and nailing too close to the inner wall, causing soreness and fever, which will start contraction.

The first and most important part of the treatment is to get the hoof soft. In order to do this, use a bran and lye poultice. There is no other remedy equal to this. It performs two functions, softens, and at the same time relieves a great portion of the soreness. To poultice, I take a block of wood a little larger than the foot, cut off an old rubber boot leg, tack my block inside, put in my poultice and slip it on the

foot. Tie the top to the leg. Have the poultice changed about every ten hours for three days. Then comes the smith's part. Dress the foot down well, not touching the frog, turn a bar shoe to fit the frog, giving the bar a frog pressure and not allowing the heel to rest on the shoe. After the shoe is properly put on, use a sweating liniment, corrosive sublimate, gum camphor, alcohol, one ounce of each, spirits of turpentine, eight ounces. Grind the corrosive sublimate fine, then add alcohol, and shake well, after which add the camphor and turpentine. In two days it will be fit to use. Apply once a day above the hoof, extending it up from the coronet about two inches. Three applications is all that is required in most cases. When well blistered, dress with lard. Wash the foot every two or three days with castile soap and when dry grease with lard. Repeat this until all scurf is removed. If a permanent cure is not accomplished, repeat the liniment. My results are excellent. WILLIAM F.

Treating Tool Steel—Replying to the inquiry of Mr. Fred Barney in the December issue about the cracking of steel while hardening, in my experience with different steels, I have found that it does not always indicate a poor steel, or the wrong steel, if it cracks while being hardened.

There are generally other causes of cracking, which can usually be avoided by taking proper precautions in the heating and dipping to prevent strain in the steel. In my work every day, I have large numbers of tools and dies of various forms and sizes to forge and temper, and have had very good success, very seldom losing one.

After forging a tool, I always reheat it slowly, to a uniform refining heat, and put it aside to cool slowly, thus relieving the strain set up in the steel by forging. Then when ready for tempering, I heat slowly to a uniform refining heat and harden. To relieve the strain set up by hardening, and get a good job of tempering, I proceed in the following way, which is, no doubt, familiar to a number of tool smiths: First, I bring the piece to be hardened to an even heat (avoid overheating). Then plunge it into the bath, and before it is set or cold remove quickly. If it should be a large piece, put it immediately into a bath of raw linseed oil, or fish oil (I prefer the linseed), and leave it there until cold. Then I polish it and draw it to color or temper desired. To draw the temper we use either hot lead, hot sand, a hot plate, or gas plate, according to size and shape of the piece. If it is a small article, I proceed as follows: After removing from the water bath, hold it immediately over the fire or in the furnace until it heats sufficiently to "hiss" when touched with the wet hand. Then polish quickly and draw to temper desired. Drop it in the oil to cool slowly. I have found the above described method very successful, more so than some ways which I have heard of and tried. I also find that it pays to experiment, but don't experiment on new or good tools and dies. Use old ones for that, or better still, find out before you make your tools just what kind of steel there is in the bar to work with. Take off a small piece and try it.

In hardening, if clear water will not make the job hard enough, there are a number of different baths which are often used with success. I sometimes use the following bath for heavy work, or for low carbon steels: Fill an ordinary barrel nearly full of clear water, add six or seven handfuls of common salt, half a dozen

large spoonfuls of ground alum, and half a dozen spoonfuls of powdered saltpetre. Sometimes I add a little salammoniac.

In dipping a job to harden, the workman generally has to use his best judgment, for the manner of dipping depends on the shape and size of the job. I always try to cool the heavy parts of a piece first, thus reducing the strain. This is my experience. W. J. TODD.

An Interesting Letter from Canada—I, for one, am much pleased with the success that followed the publication of THE AMERICAN BLACKSMITH in so short a time since its first issue. But to still add to the usefulness of a trade journal in order to make it of the greatest benefit to the thousands of readers, we should not wholly depend on the editors to give us new pointers in our profession, but should aid one another by contributing to its columns articles such as we may have gained knowledge of by long or short experience in the business.

Although it is not expected that the contributions must be couched in such a style as would be expected of a college graduate, neither is it necessary, as plain shop talk style is often much preferable to the high flown effusions of a graduate of the best university. It is not the style or tone of the contributions that makes it valuable, but the information which it imparts to others, and I believe that in the line of general blacksmithing more information can be gained by the interchange of ideas, methods and manners of doing our work, than in any other trade in the country. Nearly every blacksmith has to be an inventor, in order to do justice to the many difficult jobs that are brought to him to make or repair. He gets puzzling cases in horseshoeing, and is expected to be able to correct a trotter into a pacer and vice versa by shoeing—to regulate the gait and make a four-minute horse go in 2.20 all by shoeing. He is to correct all faulty actions, and stop interfering, forging, cross-firing and a host of other defects in that line. Besides he is expected to be a veterinarian in curing such diseases as contraction of the feet, flat-footedness, corns, thrush, misshapen hoofs, etc. Then when the season is on, he must know all about putting in condition the implements for tilling the soil, and later on the repairing of mowers, binders, rakes, drills, disks and even engines on threshing machines, besides many other things which he probably never saw before. Now, in repairing such jobs, we often have to invent a way to do it and we may succeed in most cases, but we often spend much time by not taking the best course, and therefore the information gained by the interchange of ideas through a journal, such as THE AMERICAN BLACKSMITH, would be of great mutual benefit, not alone to the young beginner, but to all, no matter how clever or how long they have been in the business.

I have, as an example, been at that kind of work forty-two years, and I find that when closely reading a trade journal that I have very much to learn yet, and have been materially benefited by adapting the methods of others. One thing I wish to draw the attention of the readers to, is this: Questions are often asked as to how to do this or that job, and are usually answered by some one, but what I consider wrong is that the person getting the information gratis seldom has the good sense to state what success he has obtained, or to thank his informant for his kind assistance. If that were more generally done, such as J. C. Shay did in the January number, it would be

much more of an inducement to offer advice and help others than when kept in ignorance of the results of the advice furnished. CANUCK.

An Interesting Shop Letter—Power and Mill Picks—Please renew my subscription to your paper for one year and find enclosed \$1.00 for same. I consider the "American Blacksmith" the very best journal of its kind now before the blacksmiths, and those who are not acquainted with its valued pages are the losers, indeed. The "Queries and Answers" column is well worth the price of the paper for any smith to read and profit thereby. We find various ways of doing work, but how many of us ever experiment or profit by them? For my part, I never see a new way of doing a job of work but that at my first leisure moment, I try it, and I have found several jobs that could be done much easier by following these suggestions than my way of doing the same work.

I enjoy the talks on "Power in the Shop" for I am interested in the same, and I will give you a slight description of my shop.

In putting power into a shop, I would advise, do not be afraid of getting too much power—better too much than too little. It is cheaper in the long run to have a ten-horsepower engine doing four-horsepower work than to have a four-horsepower engine pulled to a full capacity all the time. I have a four-horsepower gasoline engine made by Fairbanks, Morse & Co., Chicago, Ill. Having had varied experience with several makes, I consider this engine to be the best on the market. With this I run a 16" by 72" iron lathe, Little Giant trip hammer, Champion No. 400 blower, Western Chief drill, Reynold's tire bolter, emery wheels, both grinding and polishing; grind stone, disc sharpener, spoke tenoning machine, and for summer use a fan. I expect soon to put in a band rip saw, spoke machines and hub bore. I have plenty of power for all these various machines at once and some to spare. When I first bought my engine customers asked why I got so large an engine. My only answer was "I will be economy in the long run" and as they see one by one some new piece of machinery added, they wonder whether I have power enough, so I say, do not be afraid of getting too much power.

I note in the December number a query for a first-class receipt for tempering mill picks. I have one that was handed down to me by my grandfather, one of the most successful smiths and gunmakers of pioneer Ohio days, and one that I have used many times with best of success. To my knowledge it has never been published before, so I will give it. It consists of one ounce of cyanide of potash, $\frac{1}{4}$ ounce of bicarbonate of potash, and $\frac{1}{2}$ ounce of bicarbonate of soda. Mix to a fine powder, heat the tool to be tempered to a cherry heat, and immerse the tool in the powder. When the tool has cooled until it will not absorb any more of the powder, put it in the fire again, and heat to a very dull orange heat and plunge (straight down) into lukewarm water. Do not draw any temper. If this plan is carried out exactly, you will never ask for anything better. I have used it with best of success on drill bits for drilling, tempered springs, etc. Great care must be taken not to force the tool, but to let it have its own good time and it will do the work. For any ordinary drilling, I temper my bits in oil. I can get better results from oil than water for any ordinary tempering. FREEMAN VICORY.

Prices Current — Blacksmith Supplies.

The following quotations are from dealers' stock, Buffalo, N. Y., January 1, 1908, and are subject to change. No variations have occurred since last month's figures.

All prices, except on the bolts and nuts, are per hundred pounds. On bars and flats prices are in bundle lots.

Bars—Common Iron and Soft Steel

$\frac{1}{4}$ in., round or square; Iron, \$3.10; Steel, \$2.90
$\frac{3}{8}$ in., " " " 2.70 " 2.70
$\frac{1}{2}$ in., " " " 2.50 " 2.40

Flats—Bar and Band.

$\frac{1}{4}$ x 1 in., Iron, \$2.50; Steel, \$2.40
$\frac{1}{4}$ x $1\frac{1}{2}$ in., " 2.40; " 2.40
$3\text{-}16$ x $1\frac{1}{2}$ in., " 2.60; " 2.60

Norway and Swedish Iron.

$\frac{1}{4}$ in., round or square, \$4.90
$\frac{3}{8}$ in., " " 4.50
$\frac{1}{2}$ in., " " 4.30
$\frac{1}{4}$ x 1 in., " 4.80
$\frac{1}{4}$ x $1\frac{1}{2}$ in., " 4.20

Horseshoe Iron.

For No. 1 shoe, $\frac{3}{4}$ x $\frac{1}{2}$ in., \$3.40
For No. 2 shoe, $\frac{1}{2}$ x $\frac{5}{8}$ in., 3.00
For No. 3 shoe, $\frac{5}{8}$ x $\frac{3}{4}$ in., 2.90
For No. 4 shoe, $\frac{3}{4}$ x $\frac{3}{4}$ in., 2.90

Toe Calk Steel.

$\frac{1}{2}$ x $\frac{3}{8}$ in. and larger, \$3.50
--

Spring Steel.

$\frac{5}{8}$ to $1\frac{1}{2}$ in. Rounds, Op. Hearth \$4.00, Crucible \$6.00
--

$1\frac{1}{2}$ to 6 in. by No. 4 gauge to $\frac{1}{2}$ in. Flats, " 4.00, " 6.00

Carriage Bolts. (Net Price per Hundred).

$\frac{1}{4}$ x 2 in., \$0.54	$\frac{3}{8}$ x $2\frac{1}{2}$ in., \$0.82
$\frac{1}{4}$ x $2\frac{1}{2}$ in., .58	$\frac{3}{8}$ x 3 in., .96
$\frac{1}{4}$ x 3 in., .62	$\frac{3}{8}$ x 4 in., 1.31
$5\text{-}16$ x 2 in., .65	$\frac{3}{8}$ x 4 in., 1.70
$5\text{-}16$ x 3 in., .75	$\frac{3}{8}$ x 6 in., 2.10

Tire Bolts. (Net Price per Hundred).

$3\text{-}16$ x $1\frac{1}{2}$ in., \$0.18	$\frac{1}{4}$ x $1\frac{1}{2}$ in., \$0.28
$3\text{-}16$ x 2 in., .21	$\frac{1}{4}$ x 2 in., .31
$3\text{-}16$ x 3 in., .27	$\frac{1}{4}$ x 3 in., .37

Hot Pressed Nuts. (Blanks).

$\frac{1}{4}$ in., \$0.09 lb. net
$\frac{3}{8}$ in., .06 " "
$\frac{1}{2}$ in., .05 " "
$\frac{3}{4}$ in., .04 7-10 " "

NOTE.—Base prices for most common sizes are listed above. Should subscribers desire net prices upon other sizes than those given, same will be published in following issues.

WANTED AND FOR SALE.

WANTED—A blacksmith, either a married or single man. **Wm. R. QUIMBY, Peapack, N. J.**

WANTED—A good horseshoer or floorman. Good pay and steady work. **JOSEPH GEYER, Elma Center, New York.**

WANTED—An all-around blacksmith to run shop for half income. I furnish stock. **D. M. BARNES, Tracy, Ind.**

FOR SALE—A second-hand 2,000-pound Bell Steam Hammer in good condition. **COLEMAN BRASS & IRON WORKS, Elmira, N. Y.**

FOR SALE—On easy terms if sold at once, one of the finest stone Blacksmith and Horse-shoeing shops in the state in fine growing town. Owner wishes to retire from blacksmithing. **A. G. BIMSON, Berthoud, Colo.**

FOR SALE—Shop and tools in first-class location, with good prices. Those interested should write me about terms and business done the last three years. Am going into other business. **W. H. EXLEY, Palmyra, Neb.**

FOR SALE—For one dollar. New ideas and new methods for working steel by using Toy's hand-colored charts. Chart A explains hardening to any degree. Chart B explains scientific and plain tempering in oil, water or tallow, showing true color each tool should be and telling what it will stand. Also 40 new steel working methods on plow and machine forging, with five of the best steel welding compound receipts in use for all the new steels made. All for \$1.00. Samples Free. **W. M. TOY, Sidney, Ohio.**

Are there LAWN MOWERS in your Section?

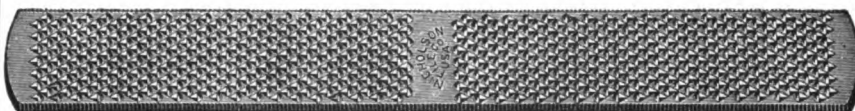
If so, you should grind them. With power and one of my grinders in your shop you could control the business in your section. Prices, \$75, \$150 and \$225. **C. R. ZACHARIAS, Asbury Park, N. J.**

NICHOLSON FILE COMPANY

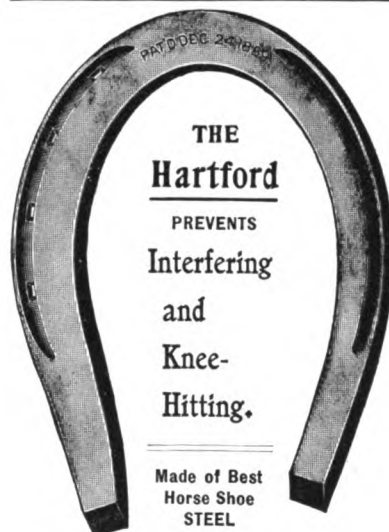
NICHOLSON.

PROVIDENCE, R. I., U. S. A.,

MANUFACTURERS OF

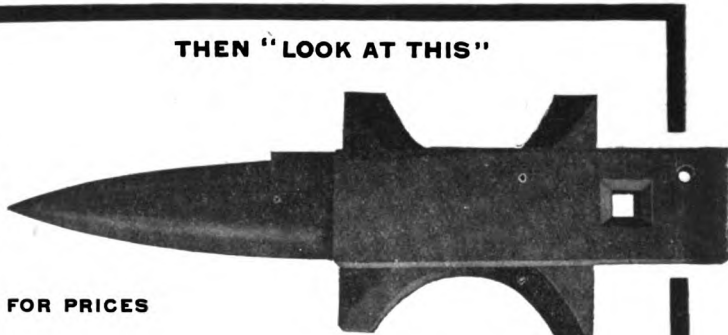
**FILES AND RASPS**

Blacksmiths Recommend our Rasps.

BECAUSE*Their Wearing Qualities Have Been Proven.*

Do You Use the best Side Weight and Toe Weight Shoe made in this country? If Not, Why Not? They cost you less labor and money and are superior to a hand made shoe. Carried by all leading jobbers. Sample pair of either size or weight mailed postpaid on receipt of 50 cents. We make four sizes Nos. 1, 2, 3, 4. Three weights—Track, Medium, and Heavy.

THE SIDE WEIGHT HORSE SHOE CO.
MECHANIC STREET, HARTFORD, CONNECTICUT.

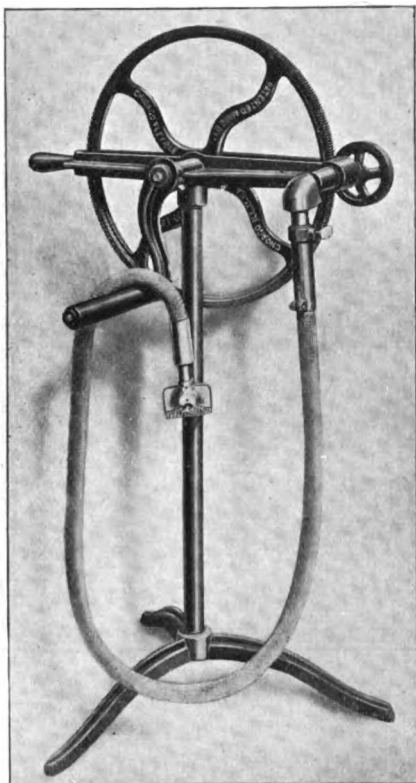
"LOOK AT THIS"**THEN "LOOK AT THIS"**

WRITE FOR PRICES

We Are Experts at Repairing Old Wrot Anvils.**COLUMBUS ANVIL AND FORGING CO., Columbus, O.**

Horse Clipping Machines.

A few years ago the benefits of clipping were not widely known, but to-day every progressive farmer and horse dealer knows that the natural process of shedding the hair is a draft on the



A LATE MODEL CLIPPING MACHINE.

vitality of the animal, and that a clipped horse looks cleaner, requires less food, and is not so liable to take cold as one with long hair.

The clipping machine, shown by the accompanying illustration, is simple, strong and compact. It is a new design, using cut gears in place of belts, and unlike former machines, can be turned with either right or left hand. This machine runs lightly and without noise, and a boy can turn the crank steadily without tiring. The knife is dustproof and guaranteed to be of superior construction and quality by the manufacturers, the Chicago Flexible Shaft Company, Chicago, Ill.

New Publications.

Hardening, Tempering, Annealing and Forging of Steel, by Joseph V. Woodworth. Price, prepaid, \$2.50.

This is a new work treating clearly and concisely on modern processes for Heating, Annealing, Forging, Welding, Hardening and Tempering of Steel. It is a book of exceptional value to metal-working mechanics, giving directions for the successful hardening and tempering of all steel tools, including milling cutters, taps, thread dies, reamers (both solid and shell) hollow mills, punches and dies, the various metal-working tools, shear blades, saws, fine cutlery, metal-working and metal-cutting tools, and other implements of

steel both large and small. Simple and satisfactory hardening and tempering processes are described.

The uses to which the leading brands of steel may be adapted are discussed, and their treatment for working under different conditions explained, also particular methods for the hardening and tempering of special brands. There are embodied various "kinks" and practical points which contribute in making the volume a useful text-book on the modern treatment of steel.

A chapter devoted to the different processes for Case-hardening is included, and reference is made to the adoption of Machinery Steel for Tools. The illustrations will help the mechanic by showing him modern devices, machines and furnaces.

Published by N. W. Henley & Co.

Dies: Their Construction and Use, by Joseph V. Woodworth. Price, \$3.00.

This work is aimed to be a complete treatise upon the Designing, Constructing and Use of Tools, fixtures and devices, together with the manner in which they should be used in the power press, for the cheap and rapid production of the great variety of sheet-metal articles now in use. It is designed as a guide to the production of cost with the maximum of output. The hardening and tempering of press tools and the classes of work which may be produced to the best advantage by the use of dies in the power press are fully treated.

The book was written by a skilled and successful workman and is one that die-makers, machinists, toolmakers and other metal workers cannot afford to be without.

Published by N. W. Henley & Co.

Scientific Horse, Mule and Ox Shoeing, by J. G. Holmstrom.

This is a treatise of 117 pages, adapted for veterinarians, farriers and amateur horseshoers. The book is handsomely printed, illustrated and is bound in cloth. Price, \$1.00.

Published by F. J. Drake & Co.

Any or all of the above three books may be had from THE AMERICAN BLACKSMITH, prepaid, for the figures stated.

Trade Literature and Notes.

The Champion Tool Company, Conneaut Lake, Pa., manufacturers of farrier's tools, hammers, vices, tongs, hoof-parers, etc., have just issued a new catalogue, which they will be glad to mail, upon request, to any one interested.

Edmund C. Beckmann, St. Louis, Mo., informs us that he is making very advantageous offers at the present time to apron-users which would repay their communicating with him regarding the same.

Mayer Bros., Mankato, Minn., state that they ship their Little Giant Trip Hammer nearly everywhere. During the past few months their sales have nearly doubled, as hundreds of smiths have put in power and added a Little Giant Hammer. One man with one of these Little Giants can do more than two in sharpening plowshares and doing general hammering; the smith's helper has little sledgeing to do, and may be used on profitable work. Mayer Bros. state that each hammer is thoroughly tested before leaving the factory, and that it will soon pay for itself in saving of labor.

Acme Tongs Company, 110 No. Kedzie Avenue, Chicago, Ill., send us a pamphlet of their Acme Adjustable Blacksmith Tongs, for which are claimed, among other things, that one pair will do the work of a dozen ordinary tongs, and that they are quickly and perfectly adjustable, are always at hand and will stand the same heat and abuse that ordinary tongs will.

Cray Brothers, Cleveland, Ohio, sent us their complete 192-page catalogue of carriage and wagon materials and tools. It shows a remarkably complete line of goods filling every requirement of the blacksmith and carriage shop and it will well repay sending for.

A neat little 10-page catalogue describes clearly and in detail the line of forges made by H. L. Chapman, Marcellus, Mich. Interesting folders describe the foot power emery grinding machines also made by him.

"R. Mushet's Special Steel"

The Original Air-Hardening Steel

and STILL UNAPPROACHABLE in general excellence.

Thirty Years' Experience in Engineering Works in all parts of the World has proved Beyond all Doubt that this Steel is in every respect

THE BEST TOOL STEEL

YET MANUFACTURED

Uniformity of Quality in Every Bar. A Great Saving in Steel, Time and Wages, and Easy to Work. There are no difficulties to contend with in forging R. Mushet's Special Steel into tools and no loss in reheating. The best all-round Steel.

R. Mushet's HIGH-SPEED Steel.

If a fast-cutting steel is required, this is the best and most reliable of this grade. It will do more work than any other known steel, and every bar is uniform and free of the "Cracking" so generally a feature in steels of this grade.

The "R. Mushet's" Steels are manufactured only by **SAMUEL OSBORN & CO.**, Clyde Steel & Iron Works, Sheffield, England.

Sole Representatives in the United States, Canada and Mexico:

B. M. JONES & CO.

159 Devonshire St., BOSTON.

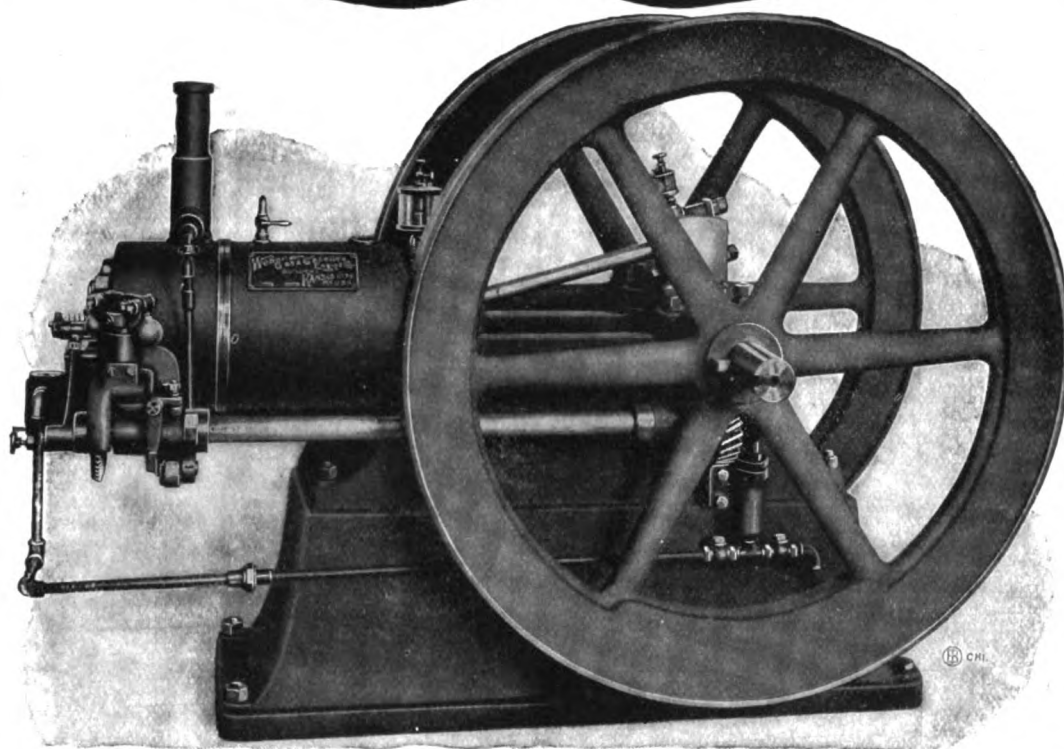
143 Liberty St., NEW YORK.

TWO BLACKSMITH'S SPECIALTIES

5HP

WEBER

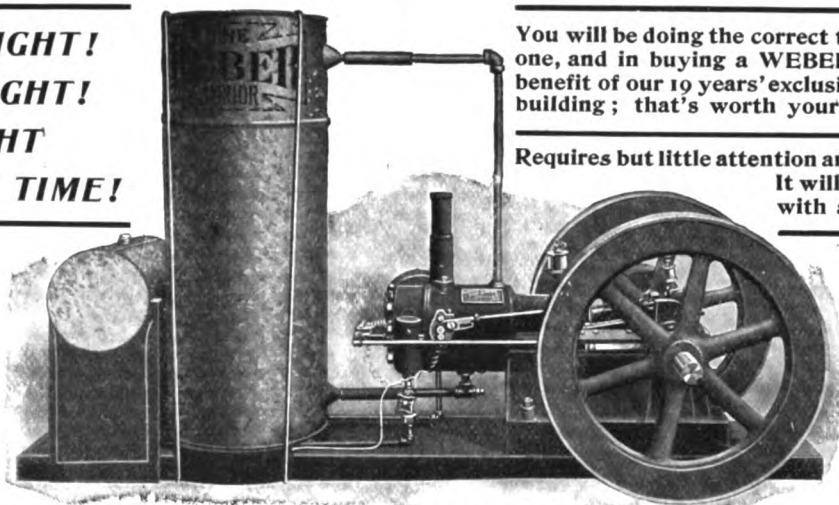
2½ HP



The 5-Horsepower WEBER Engine

**BUILT RIGHT!
LOOK RIGHT!
ARE RIGHT
ALL THE TIME!**

SOLID
STRONG
SIMPLE
AND
DURABLE



You will be doing the correct thing to put in one, and in buying a WEBER you get the benefit of our 19 years' exclusive Gas Engine building; that's worth your looking into.

Requires but little attention and small space.
It will last a lifetime with a little care.

POWER-
FUL
AND
ECO-
NOMICAL

The 2½ Horsepower WEBER JUNIOR as it appears at work.

Every Engine Sold is an Advertisement.

ADDRESS FOR PRINTED MATTER:

Every User of a WEBER is an Endorser.

Weber Gas and Gasoline Engine Company

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KANSAS CITY, MO.



Leather Aprons

Sold by all Jobbers in the United States and Canada. . . .

Miniature "Aprons" showing material and how made, mailed upon application. . . .

Sole Manufacturer
Edmund C. Beckmann
712 North 4th St.
ST. LOUIS, MO., U.S.A.

A \$50.00 Prize.

A Fifty-Dollar Scholarship in Blacksmithing and Forging in the well known International Correspondence Schools of Scranton, Pa., will be awarded as a prize to the first person sending one hundred new subscriptions to **The American Blacksmith**. This scholarship includes all the books, literature and service belonging to such a course. The opportunity is a rare one. In exchange for a little enterprise you receive a thorough training in the theory of your craft.

To those entering the contest but failing to obtain the prize, a liberal cash commission will be given.

Candidates for this prize must enter their names on or before April 1, 1908.

Write today for blanks, sample copies, etc.

American Blacksmith Company,
P. O. Drawer 974. BUFFALO, N. Y.

THE "BUSH" Low-down, Handy Wagon

with 4-inch tire steel wheels.



FOR \$20.10 -

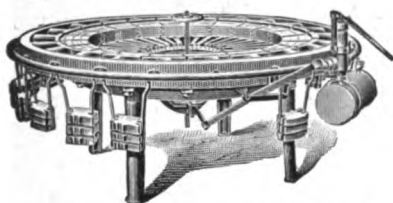
We make any size wheels to fit any skein.

WRITE TO **C. BUSH,**
QUINCY, ILL.

(MENTION THIS PAPER.)

The Hercules Hydraulic Tire Setter.

QUICK TIME.



PERFECT WORK.

Hand or Power, for Repairer or Manufacturer

It will set
A TIRE PER MINUTE

by hand.

A sixteen-year-old boy can work it. Write for Circulars and Prices. & &

NATIONAL MACHINE CO.

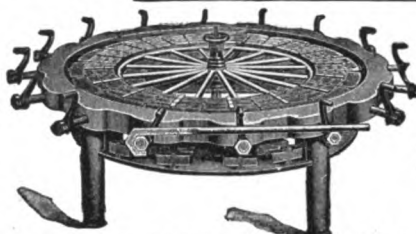
KEOKUK,
IOWA.

When you buy a Hand Power Tire Setter

get the best one made

It is the **Henderson**

700 have been made and sold



The first and last practical hand power tire setter

It sets tires cold, keeps the dish just right and puts a wheel in the best possible condition. It tightens spokes in hub and rim and all joints.

Write for Circulars, Prices and Terms.

STANDARD TIRE SETTER CO.

KEOKUK, IOWA.

This Coupler Couples in a Jiffy

Of all Shaft Coupling devices this one takes the palm for speed in shifting.

Takes but five seconds—or less if you move fast—and couples on ANY COMMON SHACKLE or JACK.

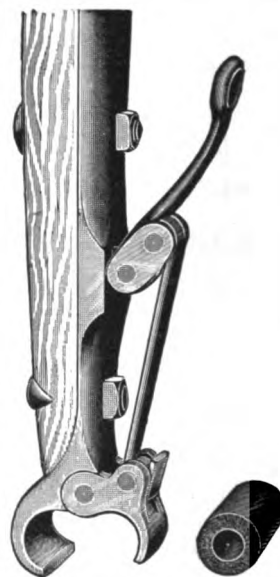
You need not let your left hand know what your right hand is doing for ONE HAND is the only tool required.

As to its other advantages, it is anti-rattling, absolutely safe, and is fastened to shafts by bolts and nuts.

Fully patented and guaranteed. Send for price list.

NONE SUCH

C. C. Bradley & Son
SYRACUSE, N. Y.



Blacksmiths, Attention! Our 1903 net Price Catalogue Is Now Ready for the Malls.

This Catalogue contains everything used by Blacksmiths, Wagon Makers, Horseshoers, etc. With lowest net prices ever offered to the trade. Will mail free upon request. Write at once. X

The EDMUND H. COOMBS CO., Fort Wayne, Indiana.

METAL SHINGLE ROOFING...



With Montross Telescope Side-Lock is the best roofing in the world for house or barn. Storm proof. Easily applied. Catalogue, Prices and Testimonials free for the asking.

Montross Metal Shingle Co., Camden, N. J.

CUT SHOWS A

No. 5 Combined Punch and Shear



with 12-in. throat for punching $\frac{1}{8}$ in., and a 12-in. blade for cutting No. 8 gauge metal, 2 x $\frac{3}{4}$ in. bars, $\frac{5}{8}$ in. round, weight 525 lbs. Made in 18 different sizes, from 240 to 2,200 lbs. We make a specialty of shears, punches and rolls. Tools for shearing, punching and bending sheet metal, bar iron and angle iron.

BERTSCH & CO.
CAMBRIDGE CITY, IND., U. S. A.

Plow Lay Welding Machine and Leveling Block Combined



An invention to provide a novel, simple, efficient and economical method of welding and shaping all kinds of plow shares. Indispensable to Every Blacksmith. Guaranteed to Give Satisfaction. If not satisfactory, money refunded. Send for illustrated circular and prices. It tells the rest.

G. S. STROM, White Rock, Minn.

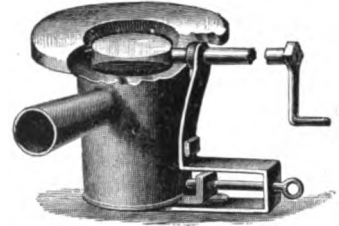
"12 YEARS IN USE AND GOOD AS EVER."

Dunahoe Bros., of Bristol, Vt., say: "Your Tuyere-Iron has been in constant use for 12 years; it has always given the best of satisfaction, and does not show any failure or wear to-day."

Our Irons heat faster, burn less coal, last longer, and give better satisfaction than any others, and our prices are right. See for yourself. You run no risk—money back and freight paid if not as represented. Write for free circulars and testimonials to

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Hand Forged Butcher Knives

Ground, Tempered and all ready for the handles, either round or riveted, for 15 cents each or \$1.50 a dozen. All sizes from 5-inch to 8-inch. These Blades are made from Sanderson Steel and warranted. Will replace any imperfect knife with two new ones. Handles all ready to put on, one cent each.

Try a sample. Hundreds of 'Smiths are using these blades and make money and friends selling them. Liberal discount in quantities. Address

WOODWORTH KNIFE WORKS,

NUNDA, N. Y.

ESTABLISHED IN 1876.



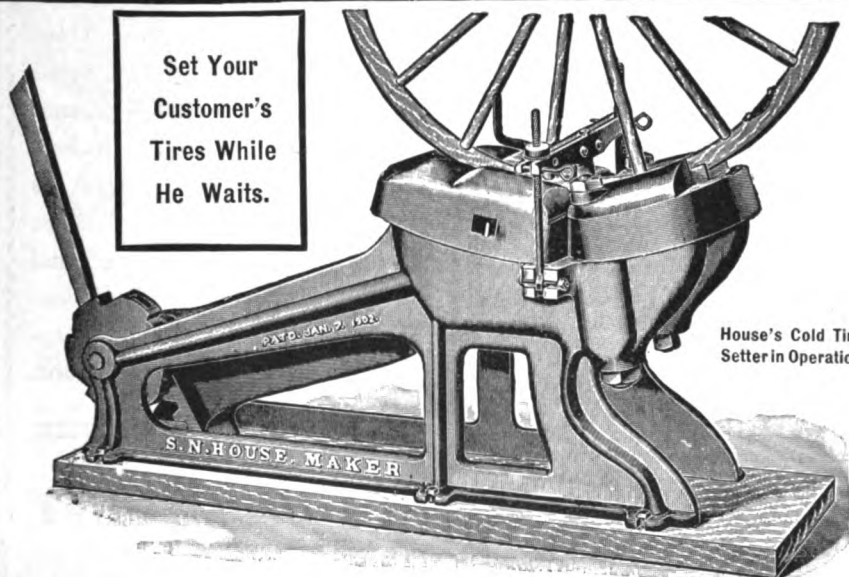
The Beaudry Champlon POWER HAMMER IS THE BEST

12 SIZES, 50 to 500 lbs. Weight of Ram

12 PRICES, - - - \$300 to \$1100

ADAPTED FOR EVERY DESCRIPTION OF FORGING

Beaudry & Co. 8 Oliver Street
BOSTON, MASS., U.S.A.



Set Your
Customer's
Tires While
He Waits.

House's Cold Tire
Setter in Operation

The House Cold Tire Setter.

ONE MAN CAN OPERATE IT.

You can't afford to lose an hour taking off a tire and setting it the old way, for you can do it better with this machine in five minutes and save your fuel and bolts. It does not injure the tire nor woodwork, for it simply grips the tire on the edges in two places close together and shrinks it in a two or three-inch space, cold, just as we have been doing for years after they had been taken off and heated.

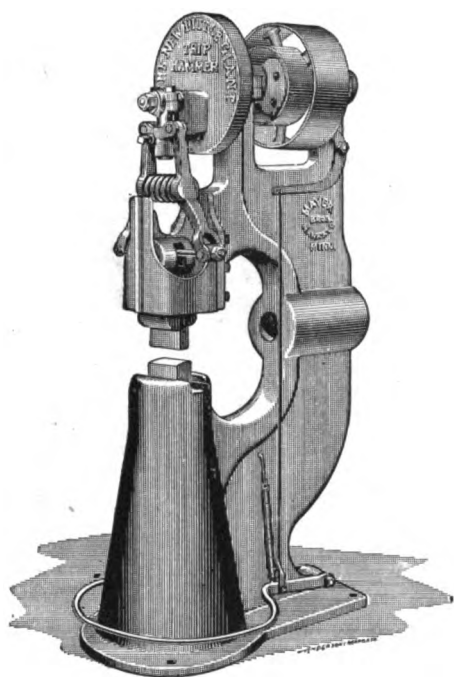
The grip keys are eight inches long, so they can't scar nor cup the tire. The wheel is screwed down firm against the machine so that the tire can't kink while setting. It sets them quickly and nicely, and it is the only machine that does. It is as simple and easily operated as the hot tire setters, made on the same principle, and will last forever. It is made of steel and cannot be broken; it weighs seven hundred pounds. Write at once for descriptive circular and price, which is very reasonable. It is for sale by nearly all the leading hardware dealers.

Will ship on trial. It is manufactured by

S. N. HOUSE,

510 Spruce Street,

ST. LOUIS, MO.



THE NEW LITTLE GIANT
U. S. PATENT, JANUARY 1, 1901
CANADA PATENT, AUGUST 20, 1901

550 NOW IN USE

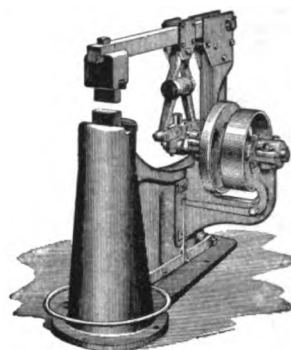
TRIP HAMMERS

NOW IS THE TIME TO BUY

A TRIP-HAMMER
Is the Blacksmith's
BEST HELPER

And Will Pay for Itself

IN ONE YEAR



THE EASY
PATENT APPLIED FOR

50 NOW SOLD

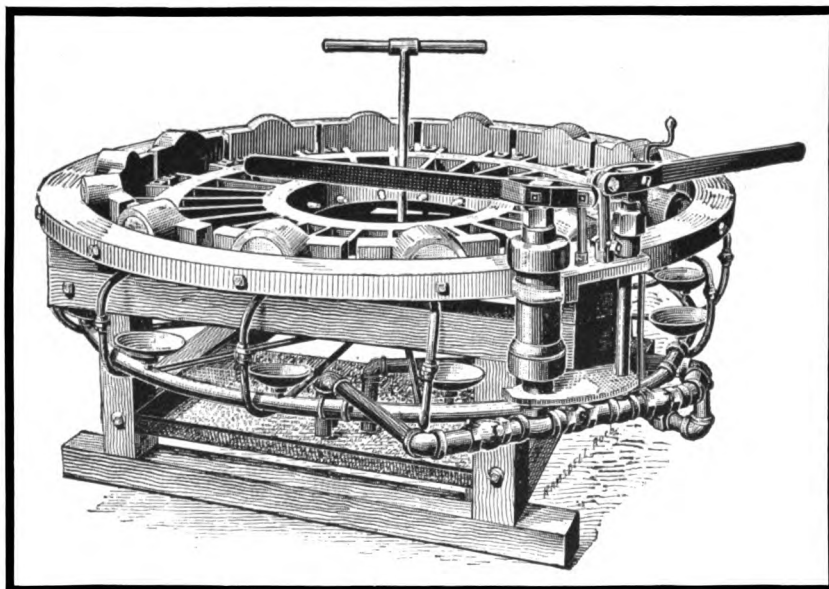
For Prices and Information

Write to

MAYER BROS.
MANKATO
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MENTION
THE AMERICAN
BLACKSMITH

Increased Capacity.



WE desire to call the attention of Blacksmiths and Repair men to the fact that our new "Hydraulic Junior" Hand Tire Setter is now made suitable for handling tires 3-4 inch x 3 inches, and all lighter sizes—wheels 54 inches diameter down to 34 inches and all intermediate diameters, and we shall be glad to furnish particulars as to price and terms upon application from interested persons.

Address
"Junior Department,"

THE WEST TIRE SETTER COMPANY
ROCHESTER, N. Y.

LANCASTER BLOWER

No. 400

We Build a Complete Line of Blacksmith Drills and Forges

WRITE FOR NEW CATALOGUE

OUR Forges are up-to-date, having valuable features, found in no other forges. Built for heaviest work. Furnished with our new ball tuyere and improved fire pot with centre and side blast, still friction clutch and ring-oiling bearings.

This Blower has accurate Machine-Cut Gears and Direct Drive Spiral Gearing and will supply more air and that at a higher pressure for the same amount of power than any other upon the market.

SIMPLE
COMPACT
SMOOTH
AND
NOISELESS

NO SLIP
OR
LOST
MOTION

THE Ring-Oiling Bearing does away with the wasteful friction, prolongs the life of the machine, and doubles its ease of running. Our Portable Forges are the only ones on the market built with ring-oiling bearings. Our friction clutch is something new, and an immense improvement over the old style. IT CANNOT SLIP.

Niagara
Blacksmith
Forge
No. 250

Lancaster Forge & Blower Co.

Office: Buffalo, N. Y. Works: Lancaster, N. Y.



Blacksmith to Chief Engineer Through the I. C. S.

Before I became a student of the I. C. S., I was working as blacksmith's helper. About the time that I purchased my scholarship my employers started an Electric-Light Plant, and placed me as dynamo tender. I now have charge of this plant at a salary which is 50% more than I received as blacksmith's helper. It was through your instruction that I became qualified to hold this last position.

FRED E. HAWKINS,
Gowanda, N. Y.

This is but one of many hundred indorsements proving that our students succeed. Our new free booklet, "1001 Stories of Success," gives the names, addresses, and progress of over a thousand other students whom we have placed on the road to progress and prosperity. Start TODAY to rise!

Fill out and send in the Coupon NOW!

International Correspondence Schools,

Box 1302, Scranton, Pa.

Please send me, FREE, a copy of "1001 Stories of Success"; and explain how I can qualify for position marked X below.

<input type="checkbox"/> Steam Engineer	<input type="checkbox"/> Civil Engineer
<input type="checkbox"/> Foreman Blacksmith	<input type="checkbox"/> Surveyor
<input type="checkbox"/> Foreman Machinist	<input type="checkbox"/> Mining Engineer
<input type="checkbox"/> Foreman Toolmaker	<input type="checkbox"/> Sanitary Engineer
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<input type="checkbox"/> Foreman Molder	<input type="checkbox"/> Architectural Draftsman
<input type="checkbox"/> Mechanical Engineer	<input type="checkbox"/> Sign Painter
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<input type="checkbox"/> Gas Engineer	<input type="checkbox"/> Ornamental Designer
<input type="checkbox"/> Refrigeration Engineer	<input type="checkbox"/> Navigator
<input type="checkbox"/> Electrical Engineer	<input type="checkbox"/> Bookkeeper
<input type="checkbox"/> Elec. Machine Designer	<input type="checkbox"/> Stenographer
<input type="checkbox"/> Electrician	<input type="checkbox"/> Teacher
<input type="checkbox"/> Telephone Engineer	<input type="checkbox"/> To Speak French
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REGAL GASOLINE ENGINES.

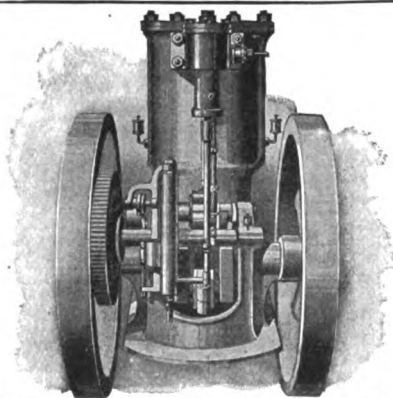
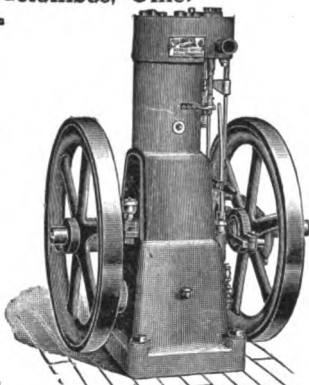
We make a specialty of $1\frac{1}{2}$ H. P. to 4 H. P. Just the sizes you want for power in the shop. They are high grade, easy to operate, have no complicated parts to get out of order, and give satisfaction. If you want a good engine, write us for catalogue "12." It tells about them.

Regal Gasoline Engine Co.
Coldwater, Michigan.



COLUMBUS GASOLINE ENGINES
ARE THE THINGS FOR BLACKSMITHS
COLUMBUS MACHINE COMPANY
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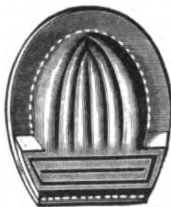
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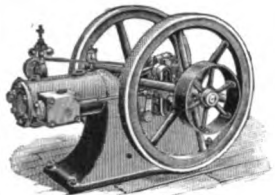
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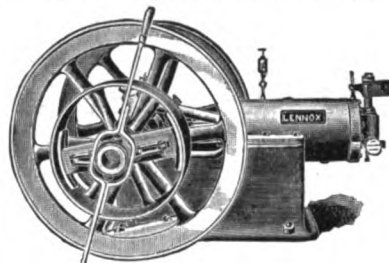
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THE fine gradation in weight precludes the possibility of any vibration that would tend to weaken the repaired shaft.



Special
Sizes and
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If Desired



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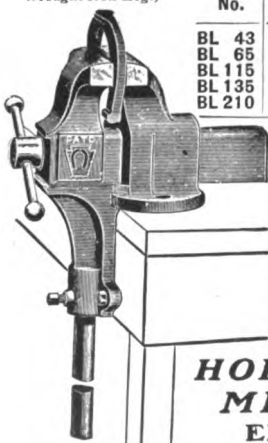
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(With Inserted Wrought Iron Leg.)



No.	Width Jaw	Opens	List
BL 43	4 in.	4 in.	\$16.00
BL 65	5 in.	5 in.	24.00
BL 115	6 in.	6 in.	37.00
BL 135	7 in.	7 in.	58.00
BL 210	8 in.	8 in.	90.00

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Any blacksmith can fit a (wrought iron) leg to this vise if it is desired.

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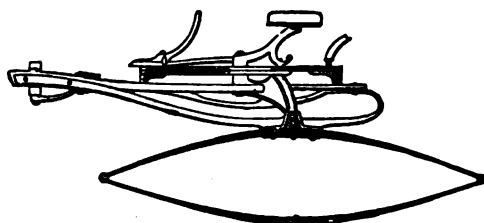
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Builders of all kinds of

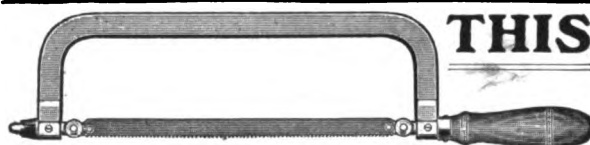
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A Book for Practical Smiths

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WITH RULES, TABLES AND RECIPES.

A necessity for Blacksmiths, Horseshoers, Wagon-makers, Mechanics and Apprentices.

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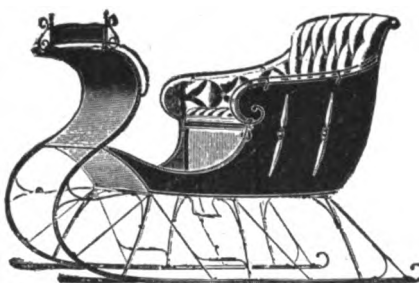
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American Blacksmith Company

P. O. DRAWER 974.

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We are offering special inducements in the way of low prices for orders placed during the next thirty days.

Write for catalogue and price-list.

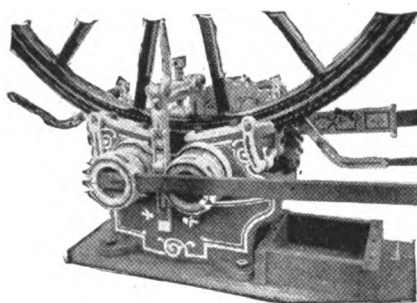
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Send for our special winter terms and prices.

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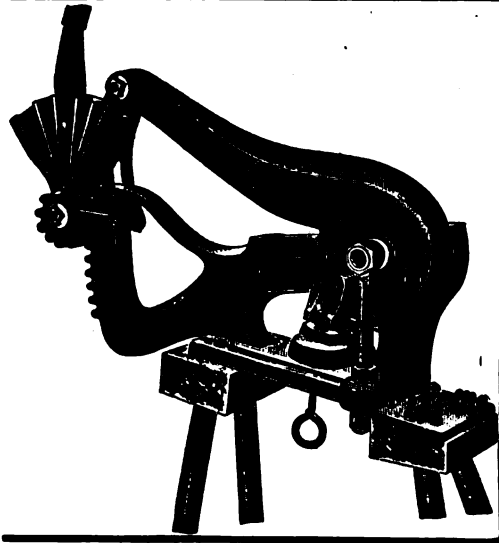
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MAKES EVERY KIND OF PLATE FOR PRINTING USE % %
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In using it the operator stands in front of the device and can with ease handle the machine with

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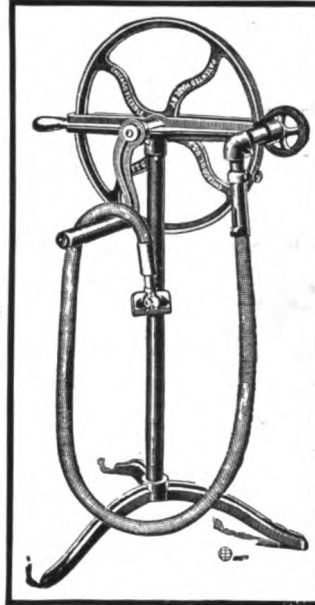
DESCRIPTION.

It will shear $3 \times \frac{3}{4}$, $4 \times \frac{5}{8}$, $5 \times \frac{1}{2}$ -inch cold iron, and will also trim plow points, etc. It will cut any size bolt or bar up to $\frac{3}{4}$ inch. It will punch $\frac{1}{2}$ -inch holes in $\frac{1}{4}$ -inch iron and is provided with the following size punches, $\frac{1}{8}$, $\frac{1}{4}$, $\frac{3}{8}$, $\frac{1}{2}$, and these are furnished with each machine.

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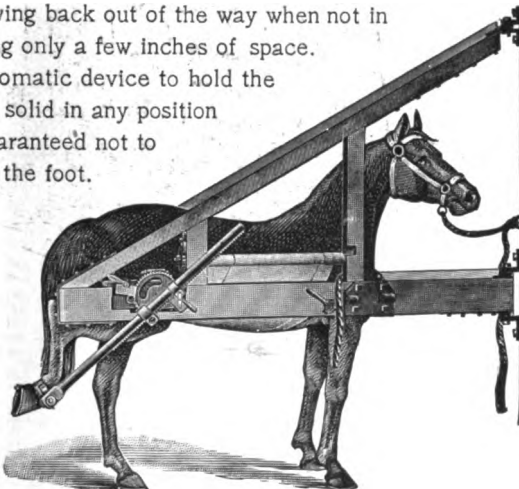
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THEIR SLOGAN (WAR CRY) IS

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**ALL GRADES.
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CHEAP BEST GRADES.**

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The TURNER GASOLINE Double-Jet Torch



FOR BRAZING, TEMPERING, DRAWING TEMPER, ANNEALING, BURNING OFF PAINT, SOLDERING, OR ANY OTHER WORK REQUIRING HEAT, THIS TORCH IS MORE THAN TWICE AS GOOD AS ALL OTHERS.

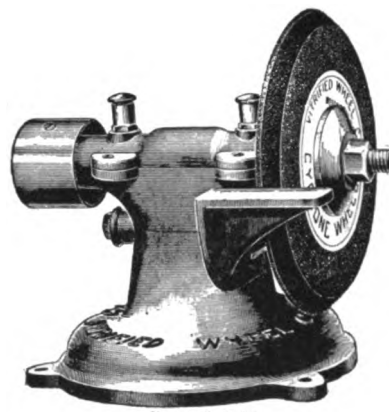
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No. 4 A Double-Jet Torch, each, \$4.50.

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Handy Grinder.

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Will Pay for Themselves many times over in doing your Custom Grinding.

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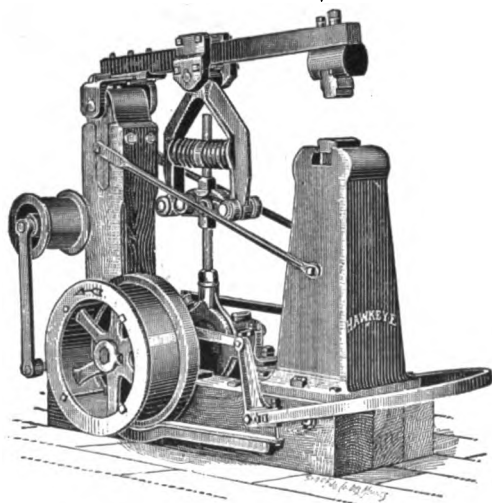
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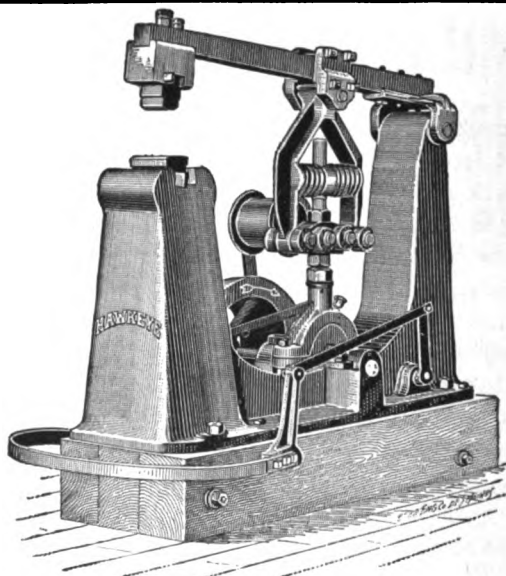


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These Hammers will strike as light as you like and heavy enough to do the work we claim for them.

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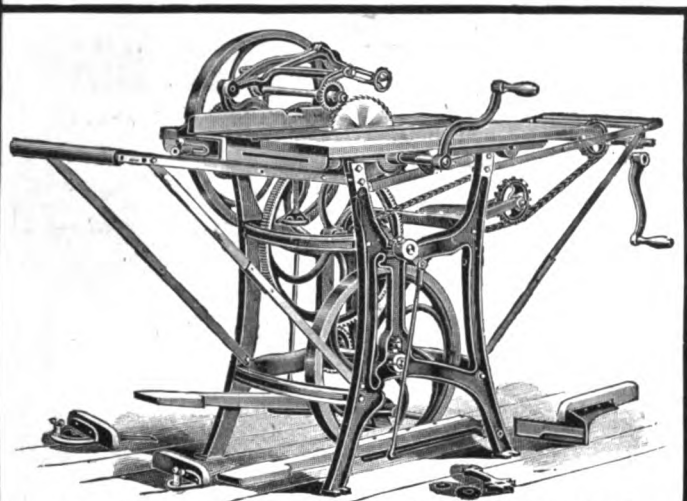
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Combination Saws

Are suitable for ripping, cross-cutting, mitering, rabbeting, grooving, dadoing, edging up, and, with extra attachments, boring, scroll-sawing, . . . edge molding, beading, etc. . . .

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Made in sizes

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Weight
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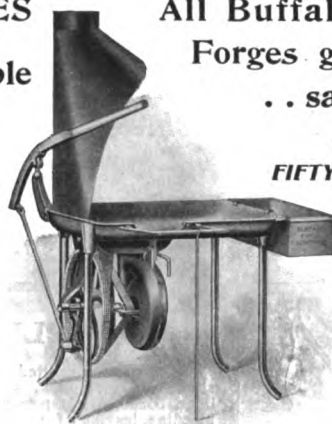
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OUR GUARANTEE. The guarantee of the Buffalo Forge Company has always been: If any forge or blower is not as represented and perfectly satisfactory return AT OUR EXPENSE. That is why they have always been recognized as the standard of the world.



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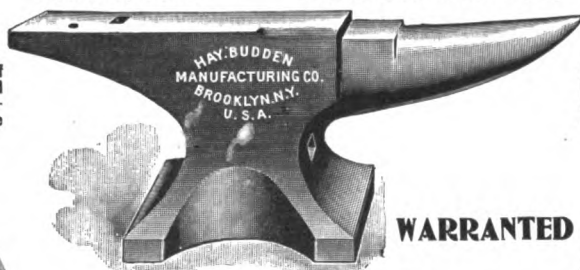
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HIGHEST AWARD**

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WEIGHTS FROM 10 TO 800 LBS.

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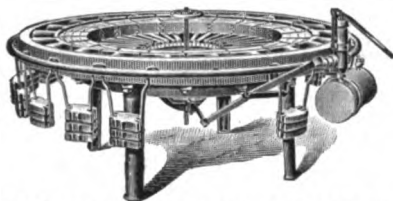
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IT WILL SET A TIRE PER MINUTE BY HAND.
MADE IN SEVERAL SIZES.

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BECAUSE
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ELECTRIC FORGE BLOWER ON THE MARKET

Send for Descriptive Circular and Prices.

Frank Snyder & Bro.
Meadville, Pa.

DENMAN & DAVIS STEEL AND IRON

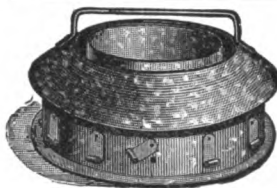
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DOWD'S Tire Heater

burns any kind of fuel. Can be used in or out doors. Holds up to 10 sets of tires at a time.

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The Coolidge Wrench. A Patent Adjustable Bit-Brace Wrench.



Instantaneous Perfect Adjustment. Always Holds. Saves Time. Saves Wrenches. Works where others will not. Indispensable to Every Blacksmith.

Manufacturers and Proprietors,
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We Furnish Wheels

with Rubber Tires on for the same price as others charge for re-rubbing old wheels. We furnish all sizes with steel or rubber tire. You are not prepared to meet competition without our prices.

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THE "BUSH" Low-down Handy Wagon

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We make any size wheels to fit any skein.

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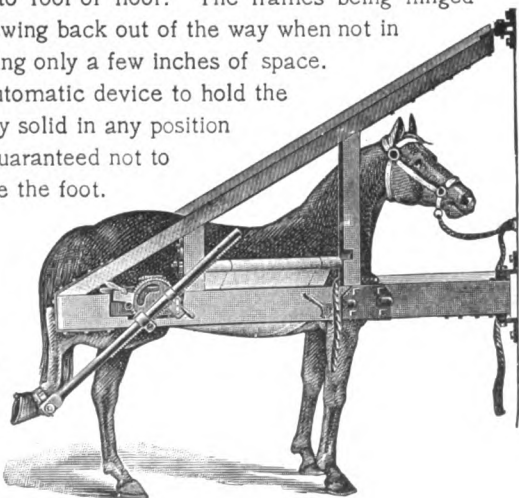
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That's a pretty good testimonial for

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The most easily operated. The simplest, best principle and perfect in every detail.

No block and tackle with ropes to get tangled and break. No bracing to roof or floor. The frames being hinged to the wall swing back out of the way when not in use, occupying only a few inches of space. A perfect automatic device to hold the foot perfectly solid in any position desired. Guaranteed not to skin or chafe the foot.

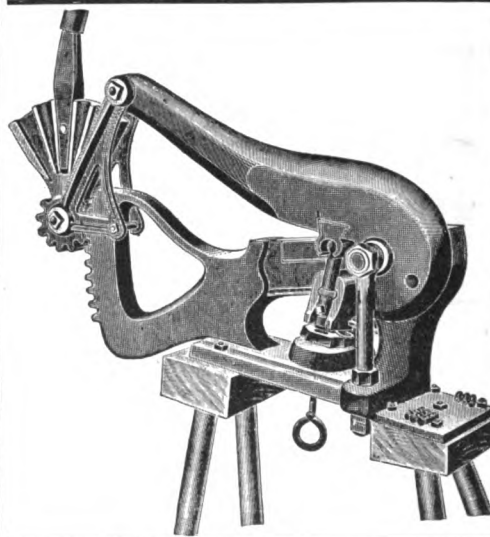


Not the
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Attention, Blacksmiths!



The Sears Blacksmiths Device Guaranteed satisfactory free from every objection, with points of excellence found in no other machine on the market. Will last a life time with proper care. It only requires one man to operate this machine.

In using it the operator stands in front of the device and can with ease handle the machine with

one hand, leaving the other hand free to place the work before cutting or punching same.

DESCRIPTION.

It will shear $3 \times \frac{3}{4}$, $4 \times \frac{5}{8}$, $5 \times \frac{1}{2}$ -inch cold iron, and will also trim plow points, etc. It will cut any size bolt or bar up to $\frac{3}{4}$ inch. It will punch $\frac{1}{2}$ -inch holes in $\frac{1}{2}$ -inch iron and is provided with the following size punches, $\frac{1}{16}$, $\frac{1}{8}$, $\frac{1}{4}$, $\frac{5}{16}$, $\frac{3}{8}$, $\frac{7}{16}$, $\frac{1}{2}$, and these are furnished with each machine.

For sale by all jobbers. Send for catalogue.

GEO. SEARS & CO.,
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LANCASTER BLOWER

No. 400

We Build a Complete Line of Blacksmith Drills and Forges

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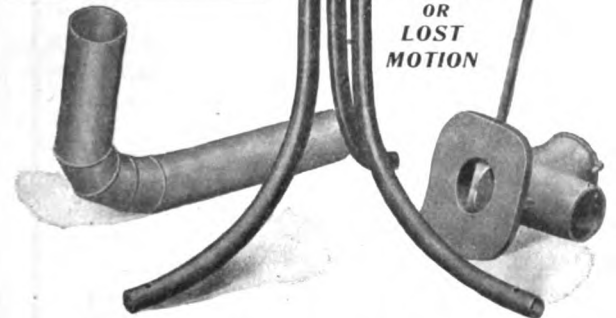


This Blower has accurate Machine-Cut Gears and Direct Drive Spiral Gearing and will supply more air and that at a higher pressure for the same amount of power than any other upon the market.

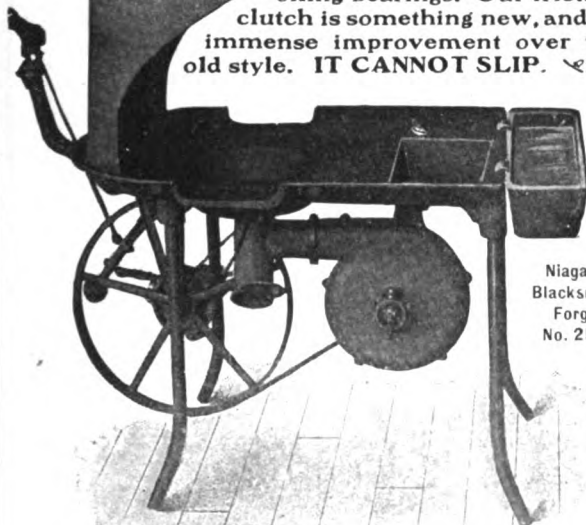
OUR Forges are up-to-date, having valuable features, found in no other forges. Built for heaviest work. Furnished with our new ball tuyere and improved fire pot with centre and side blast, still friction clutch and ring-oiling bearings.

SIMPLE
COMPACT
SMOOTH
AND
NOISELESS

NO SLIP
OR
LOST
MOTION



THE Ring-Oiling Bearing does away with the wasteful friction, prolongs the life of the machine, and doubles its ease of running. Our Portable Forges are the only ones on the market built with ring-oiling bearings. Our friction clutch is something new, and an immense improvement over the old style. IT CANNOT SLIP.



Niagara
Blacksmith
Forge
No. 250

Lancaster Forge & Blower Co.

Office : Buffalo, N. Y. Works : Lancaster, N. Y.

Do YOU Want A Better Position

The indorsements and photographs that we have published in the various magazines, during the past year, promptly convinced many that we could train them for advancement. For the few who still doubt that we can enable them to better their positions and increase their salaries we have compiled, at a great expense, the 48-page booklet illustrated below.



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Please send me, FREE, a copy of "1001 Stories of Success," and explain how I can qualify for position marked X below.

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<input type="checkbox"/> Foreman Patternmaker	<input type="checkbox"/> Sanitary Engineer
<input type="checkbox"/> Foreman Molder	<input type="checkbox"/> Architect
<input type="checkbox"/> Mechanical Engineer	<input type="checkbox"/> Architectural Draftsman
<input type="checkbox"/> Machine Designer	<input type="checkbox"/> Sign Painter
<input type="checkbox"/> Mechanical Draftsman	<input type="checkbox"/> Chemist
<input type="checkbox"/> Steam Engineer	<input type="checkbox"/> Sheet-Metal Draftsman
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City _____

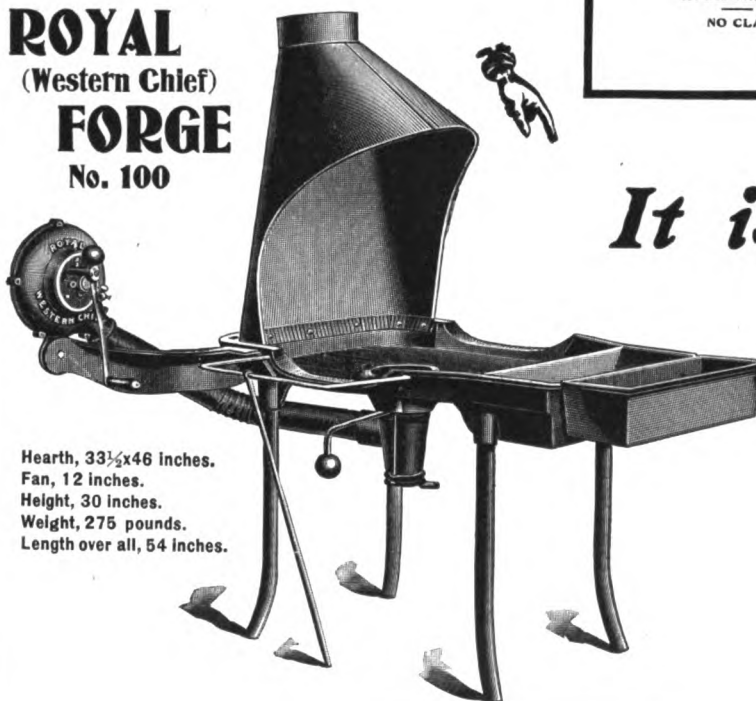
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WESTERN CHIEF

ROYAL
In Every
Sense

ROYAL
(Western Chief)
FORGE
No. 100



Hearth, 33½x46 inches.
Fan, 12 inches.
Height, 30 inches.
Weight, 275 pounds.
Length over all, 54 inches.

MADE BY

Canedy-Otto Mfg. Co.
CHICAGO HEIGHTS, ILL.

SOLD BY

First-Class Dealers
EVERYWHERE

Reliable
Our Choice
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The
ROYAL FIRE POT
NO CLAY

HANDSOMEST: Because its constructive design is symmetrical, attractive and beautiful.
SIMPLEST: Because fan case and column stand (3 parts only) is about all there is of it.
BEST: Because made of the best material, by the best workmen and best mechanical experience that can be obtained.

SUPERIOR POINTS.

No Belts, no Clutches, no Ratchets.
The blower case oscillates on its bearing, permitting hose of case to point down or out or up, as may be desired; meeting any angle of blow pipe, thereby saving one elbow and 10 per cent. of blast force; besides valuable room occupied by other blowers.
The crank turns forward or backward, as suits the operator.
The gears are Phosphor Bronze and Steel, cut on the most scientific principle; they are flat, and straight cut (no spiral or worm gears); which combined with Steel Shafts and Composition Bearings made and assembled perfectly, run noiseless, and make this the best blower in the world.
The Gear Case is oil tight and dust proof, permitting gears to run in a bath of oil.
The Blast is very powerful, and as positive and steady as a power blower, and takes less labor to operate than others. The after blast is strong and lasting.
The Column Stand and Iron Base give a solid, non-trembling foundation.
The room it takes is less than any other blower.

*It is the way
they are
built that
pleases so*



NO ONE WHO SHOES HORSES CAN
AFFORD TO BE WITHOUT A . . .

BLISS HOOF CUTTER

IT IS the Most Powerful.
DOES the Largest Range of Work.
DOES the Best Work.
EASIEST Kept in Order.
MAKES Easier Work of Hoof Cut-
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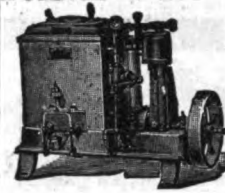
THIS Tool is Fully Guar-
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Successor to W. L. BLISS.

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Shipman's Steam Engine

The safest, best and most
efficient power for black-
smith and wagon shops.
Refined or crude oil used.
Be sure and get my prices
and catalogue—free. . . .

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BOOB'S PATENT DROP AXLE AND SINGLE ELLIPTIC SPRING GEAR

WITH SHORT TURN FIFTH WHEEL.



Adapted for Milk,
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wheel and shaft
ready for body, for
\$96.50.

Buggy, Bike and Business Wagon Gears, Wheels, Carriage and
Wagon Hardware of every description.

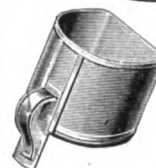
WILLIAM W. BOOB 428 E. 7th St., Cincinnati, O., U.S.A.

Every Carriage Shop

HAS USE FOR ONE OF OUR
PERFECTION VARNISH CUPS
PRICE \$1.00, POSTPAID

READY FOR USE.

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STRAINING CUP.

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WIPING CUP.

You get one for nothing with your first order amount-
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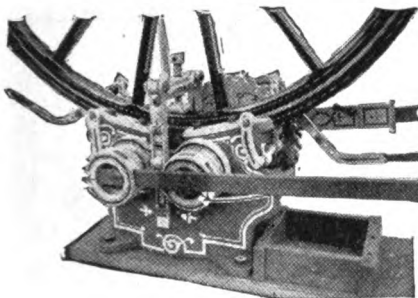
WE issue a special price list of just the things carriage painters
want and nothing else. The prices are net, cash-with-order-
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goes into the goods. The best way to buy and sell.

We will mail this sheet to you if you will mention this paper.
You will buy from it if we do—the prices are right.

GEO. E. WATSON CO.

108 LAKE STREET, CHICAGO, ILL.

Send for net price list "B" of Carriage Painters' Supplies.



SHIPPED ON TRIAL AND SOLD ON ITS MERITS.

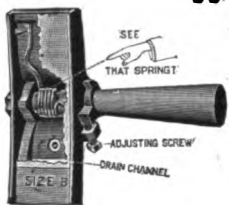
If not satisfactory and as represented, we
pay the freight both ways.

THE BROOKS COLD TIRE SETTER sets
heavy and light tires cold without remov-
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great trade drawer and money maker.

Send for our special winter terms and
prices.

Brooks Tire Machine Company

121 North Water St., WICHITA, KANSAS.



"Spring" Brake Blocks

OVER 20,000 SETS SOLD

For Carriages, Wagons and Trucks

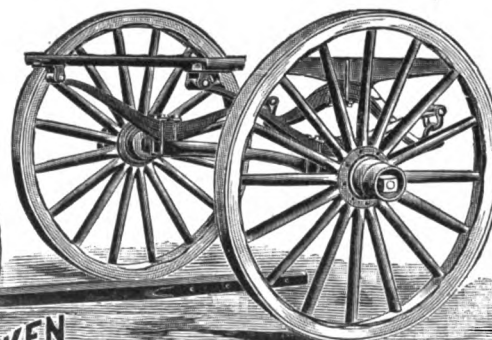
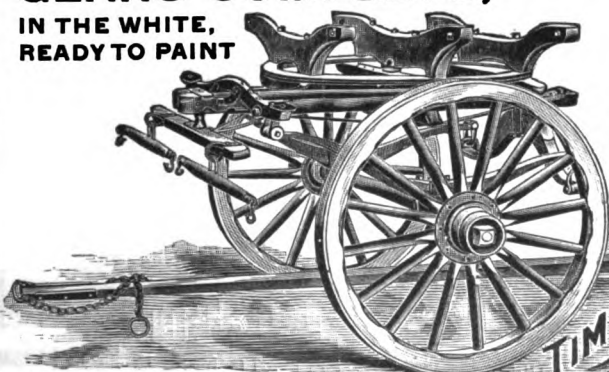
12 Sizes for Tires from $\frac{7}{8}$ in. to 5 in. wide. Wear shoes
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Steel or Rubber Tires.

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GEARS COMPLETE,
IN THE WHITE,
READY TO PAINT



TIMKEN
ROLLER BEARING AXLES
REDUCE THE DRAFT 50%

FOR LIGHT AND HEAVY
Delivery Wagons
ALSO FOR
Ice, Brewery and
Transfer Wagons

THE SELLE GEAR CO.,

SOUTH HIGH ST.
AKRON, OHIO.

In writing for prices give full
specifications and descrip-
tion of what is wanted, so
as to enable us to make
prompt quotations.

BUFFALO HAND BLOWERS

Most Improved and Powerful Hand Blowers Made.

RUNS IN OIL

Your Dealer will Send One on Trial if Desired.

ASK HIM

—ONLY—

4

GEARS

READ THE VERDICT!

J. R. HUNZINGER,

General
Blacksmithing

Repairing of
All Kinds
Promptly Done

Practical
Horse Shoeing

Olathe, Kansas.

DEC 2nd 1902.

BUFFALO FORGE COMPANY, BUFFALO, N. Y.

GENTLEMEN:

I have your hand blower up and have tried it two weeks. Am perfectly satisfied with the blower, and enclosed please find an order and draft for the second one. I have tried several different kinds of blowers and find your No. 99 hand blower superior to them all. I tried the XXX, the XXXXX, the XXXXXXX, the XXXXX, the XX, the XXX, the XXXX, the XXX, the XXXXX and the Old Reliable XXXX, that sucks ashes and cinders when it happens to be turned backward by accident or by a stranger. I will guarantee yours not to do this, as it works either way better than any of them in every respect, and recommend the Buffalo Blower to any blacksmith of any class that needs a good blower.

*Yours Respectfully
J. R. Hunzinger.*

P. S.—I have had 35 years of experience.

Box 598.

Write for _____
Latest Catalogue,
Just Out, _____

SIMPLE!
COMPACT!
DURABLE!
EFFICIENT!

**Air Blast
Strong and
Uniform.**

**Action
Smooth.**

**Operation
Easy.**

**No Lost
Motion.**

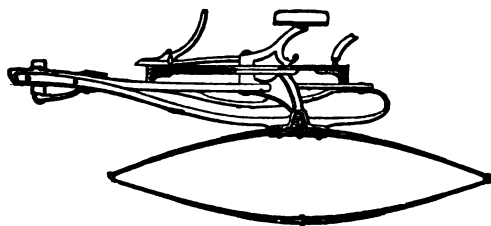


BUFFALO BLOWER No. 99.

Buffalo Forge Company

BUFFALO, N. Y.

LEE J. AUBRY CARRIAGE CO.



HEARSE CARRIAGE GEAR
WITH IRON TOP BED

139 Park Street
New Haven, Conn.

Builders of all kinds of
COACH GEARS
And Forgings for the Trade

Tell us what you want, and you will
get it. Write us at once.

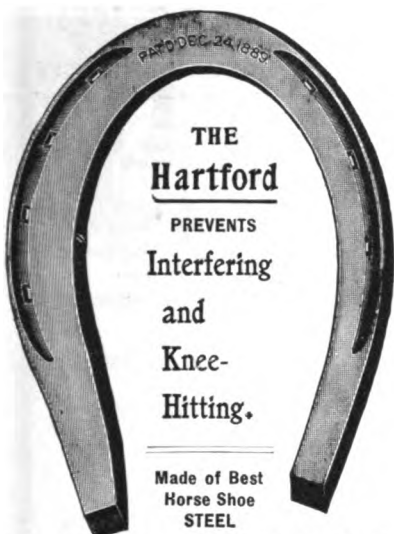
Your Hack Saw Troubles

will come to an end
if you get the old
reliable Universal
brand.



Send for our free booklet with hints on the
use of the hack saw.

West Haven Manufacturing Co.,
NEW HAVEN, CONN.



THE
Hartford
PREVENTS
Interfering
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Knee-
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Made of Best
Horse Shoe
STEEL



BOSS
TOE
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Made of
REFINED IRON

Do You Use the best Side Weight and Toe Weight Shoe made in this country? If Not, Why Not?
They cost you less labor and money and are superior to a hand made shoe. Carried by all leading jobbers
Sample pair of either size or weight mailed, postpaid on receipt of 50 cents.
We make four sizes Nos. 1, 2, 3, 4. Three weights—Track, Medium, and Heavy.

THE SIDE WEIGHT HORSE SHOE CO.
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A Monthly Illustrated Technical Journal cir-
culating amongst Coachbuilders, Wheelwrights
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"AND DON'T YOU FORGET IT."

Mohr's Blowers

FOR BLACKSMITHS. . . .

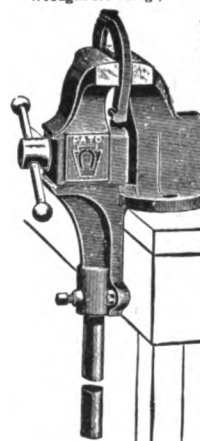
Are guaranteed equal to any, are more
convenient, require less room and have
a wider range of adjustment.

CIRCULARS FREE.

B. FRANK MOHR, Mifflinburg, Pa.

KEYSTONE MALLEABLE BLACKSMITH VISE.

(With Inserted
Wrought Iron Leg.)



No.	Width Jaw	Opens	List
BL 43	4 in.	4 in.	\$16.00
BL 65	5 in.	5 in.	24.00
BL 115	6 in.	6 in.	37.00
BL 135	7 in.	7 in.	58.00
BL 210	8 in.	8 in.	90.00

Opens Parallel

Figures in first column
of table indicate weight.
Strong as scientific de-
sign, with steel, wrought
and malleable iron, can
make it.

Any blacksmith can fit
a (wrought iron) leg to
this vise if it is desired.

**HOLLANDS
MFG. CO.**
ERIE, PA.

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The
BUFFALO
ELECTROTYPE AND
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MAKES EVERY KIND OF PLATE FOR PRINTING USE % % %
HALF-TONE ZINC ETCHING WOOD & WAX ENGRAVING
ELECTROTYPES, NICHELTTYPES, EMBOSSING, DIES, BOX PLATES, AND THREE COLOR PROCESS

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**BUFFALO
N.Y.**

MAPS,
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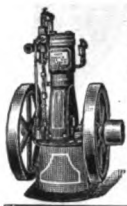
"TRINITY TRUE"

HIGH SPEED TOOL STEEL

PLENTY OF LATITUDE FOR HEATING. EASY TO MACHINE.
ESPECIALLY DESIGNED FOR HEAVY CUTTING.

NO TRICK IN TEMPERING.
BEST STEEL FOR HOT WORK.

WESTMORELAND STEEL CO., PITTSBURG, PA.



REGAL GASOLINE ENGINES.

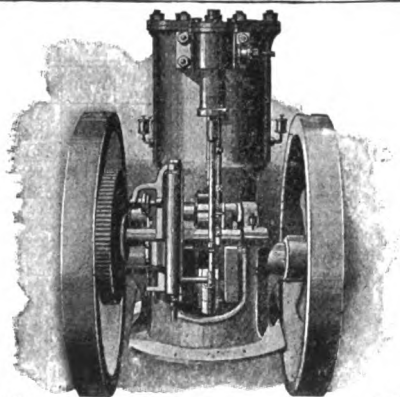
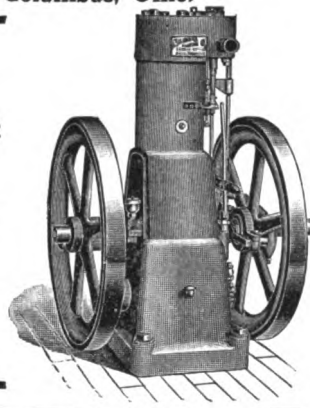
Do you want a reliable engine, one that is high-grade, up-to-date and finely finished? Our specialty is $1\frac{1}{2}$ H. P. to 4 H. P. Just the sizes you want for shop power. Engines are simple and easy to understand. Write us for catalogue "12." It tells about "Regal" Engines.

Regal Gasoline Engine Co.
Coldwater, Michigan.



COLUMBUS GASOLINE ENGINES
ARE THE THINGS FOR BLACKSMITHS
COLUMBUS MACHINE COMPANY
Columbus, Ohio.

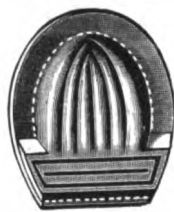
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for
Catalogue
33
Stating
Horse
Power
You
Need.



"Mechanical Feed"

Means no trouble to start, no trouble to run and full power in all kinds of weather. The latest improved and most wonderful Gasoline Engine built. Prices? Well, just cut this out and write us before you buy. We have the best engine and we will make the best prices to Blacksmiths and Wheelwrights. $2\frac{1}{2}$ to 40 H. P., all styles.

Prouty Gasoline Locomotive Co.
Lansing, Mich.



THE MOST IMPROVED RUBBER PAD
OF ITS KIND.

ORDER BY NAME "A. C." THROUGH YOUR
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Consolidated Hoof Pad Co.
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HIGH-CLASS TOOLS OF NEARLY
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704 Pages, and a Discount Sheet, sent to any address for 25 Cents
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Mr. Morse has made a special study of business systems for Carriage Builders, Blacksmiths and Metal Workers. A request for information will bring to you the best of his knowledge and experience. For any branch of your business he can tell you of systems so simple they almost care for themselves.

Perhaps you are not an experienced book-keeper and your accounts even though few and small are bothering you. Apply the card ledger system. It will lighten your work surprisingly. It is the simplest and most accurate way of keeping accounts.

\$4.65 buys a neat quarter sawed oak tray with dust proof cover, golden oak finish, highly polished, containing 500 linen bristol ledger cards, and necessary equipment of indexes.

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Ask also for catalog "A", telling of card systems—catalog "B" about letter and catalog files.

NOW, while you are thinking about it, address Mr. Morse in our care.

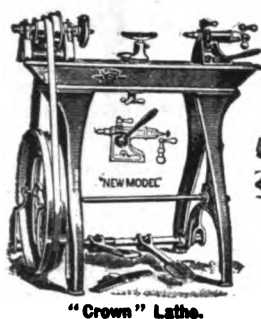
SHAW-WALKER
MUSKEGON, MICHIGAN.

Wood-Working Foot and Hand Power Machinery

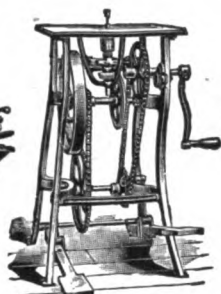
COMPLETE OUTFITS

Wagon-builders, Carpenters, Cabinet-Makers, and all workers of wood can successfully compete with the large shops by using our labor-saving machines. They are even used in shops having motor power.

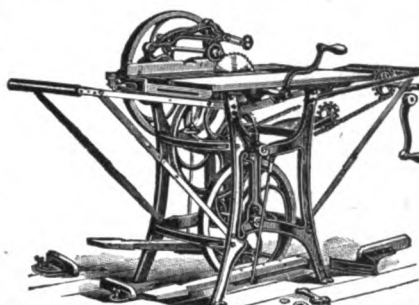
Machines Sent
on Trial



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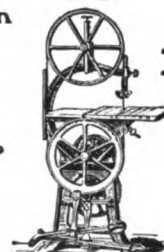
"Rex" Molder.



No. 5 "Union" Combination Self-Feed Rip and Cross-Cut Saw.



"Victor" Scroll Saw.



20-Inch
Band Saw.



"Diamond"
Mortiser.

Send for
Catalogue "A."

Considering the quality and quantity of work our machines will do, they are the cheapest machines made. They are built for hard work, accurate work, and long service.

THE SENECA FALLS MFG. CO. 274 WATER STREET
Seneca Falls, N. Y., U. S. A.

THE HOUSE

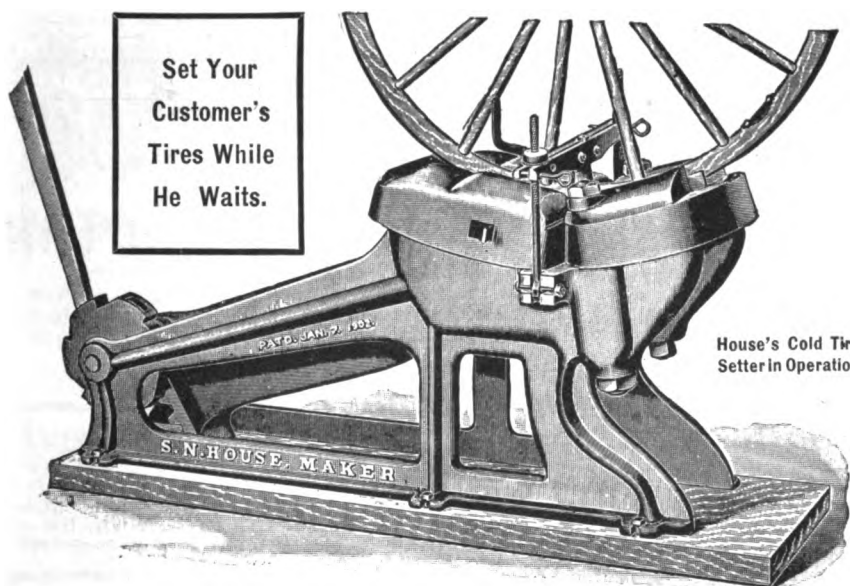
COLD TIRE SETTER

ONE MAN Can Set
Four Tires
In Twenty Minutes.

NOT NECESSARY TO REMOVE
THE TIRES OR THE BOLTS

It Does Not Crush or Injure
the Wheel.

Set Your
Customer's
Tires While
He Waits.



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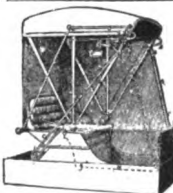
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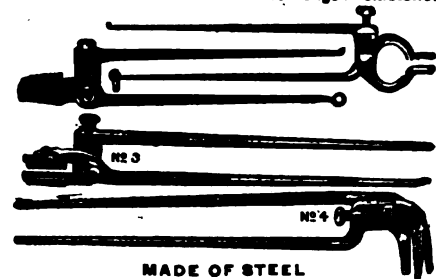
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SPECIAL NOTICE.

The American Blacksmith intends to present with the April issue **free** to every subscriber a handsome reproduction in twelve colors of "The Village Smithy," painted expressly for The American Blacksmith, by Raphael Beck.

Send a dollar now for a year's subscription with a copy of the picture. The edition is not endless.

As a **special inducement** for new subscribers, those who send their order during March will receive a **premium**, either a Handy Bench Level, or a Farrier's Hoof Knife. Don't miss our fine April spring trade issue. Subscribe now so as to be sure to get it, with a premium and "The Village Smithy."

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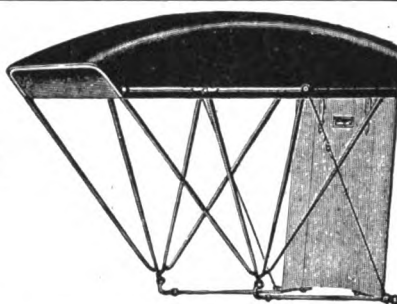
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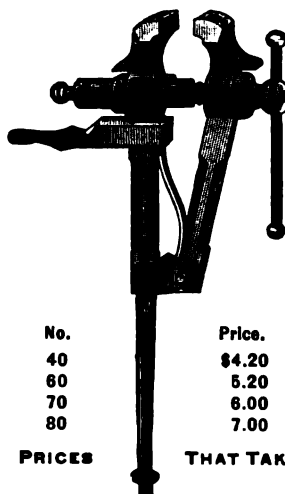
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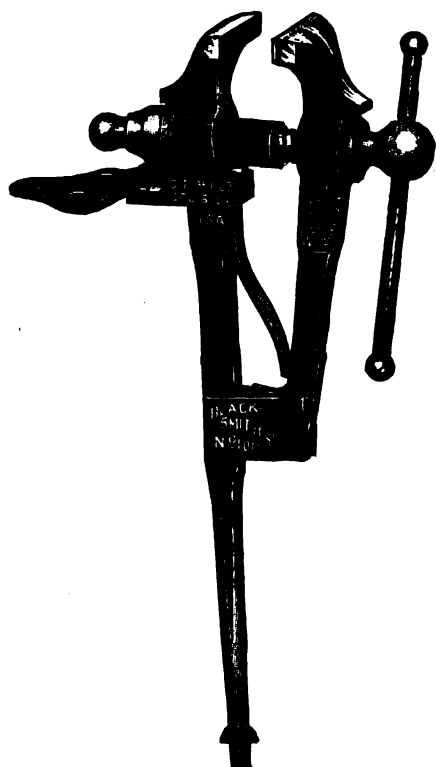
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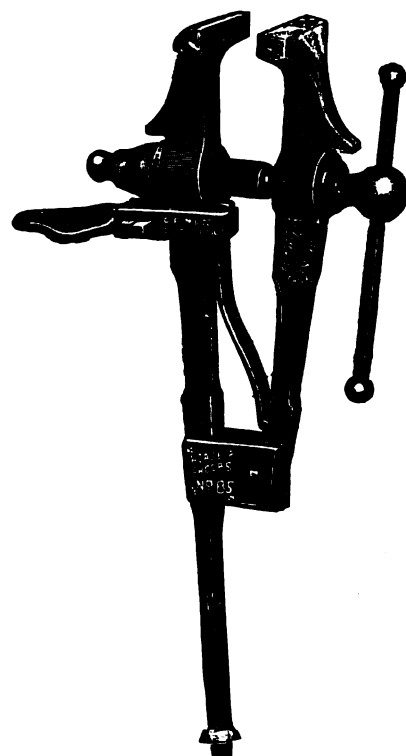
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THE AMERICAN BLACKSMITH

A PRACTICAL JOURNAL OF BLACKSMITHING.

VOLUME 2

MARCH, 1903

NUMBER 6

BUFFALO, N. Y., U. S. A.

Published Monthly at The Holland Building, 451-455 Washington Street, Buffalo, N. Y., by the

American Blacksmith Company
Incorporated under New York State Laws.

Subscription Price:

\$1.00 per year, postage prepaid to any post office in the United States, Canada or Mexico. Price to other foreign subscribers, \$1.25. Reduced rates to clubs of five or more subscribers on application. Single copies, 10 cents. For sale by foremost newsdealers.

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Correspondence on all blacksmithing subjects solicited. Invariably give name and address, which will be omitted in publishing if desired. Address all business communications to the "American Blacksmith Company." Matter for reading columns may be addressed to the Editor. Send all mail to P. O. Drawer 974.

Cable address, "BLACKSMITH," Buffalo. Lieber's Code used.

Entered February 12, 1902, as second class mail matter, post office at Buffalo, N. Y. Act of Congress of March 3, 1879.

Shops of Progressive Smiths.

If you run or work in a shop in which you take pride as being a well kept and modernly equipped establishment, the prize offer made on a following page will interest you. Send in a photograph and description in the course of the next two months. We want to secure pictures of the best shops in the country for reproduction in these columns.

The American Association of Blacksmiths and Horseshoers.

The few brief notices which have appeared in the columns of THE AMERICAN BLACKSMITH, during the last three months, regarding the American Association of Blacksmiths and Horseshoers, its aims and purposes, have awakened widespread interest, and as a result, a great host of letters have been received from all sections of the country, testifying to the fact that the time is ripe for a movement of this kind.

On behalf of The American Association, we desire to thank all who have written and displayed an interest in this matter. Up to the present time, the number of communications have been so great that it has been found impossible to reply to all of them, but in a very short time literature and other items

regarding the plans of the Association will be forwarded to all who have expressed their interest in the matter. We wish to remind our many friends who have taken this interest from the very start, that the work is a large and ambitious one, and cannot be accomplished in a day. In fact, it will require considerable hard and persistent work. The Association and its official organ, THE AMERICAN BLACKSMITH, intend to do everything in their power, but it is of course necessary to have the undivided support of all craftsmen, the ones who are so vitally interested in the matter. Naturally, the more who take part in the movement, the quicker and surer will be its success.

We wish to hear from every one who is directly interested in the matter of securing better prices for work and obtaining Lien Laws for protection from bad debts. It is a well-known fact that some men are born leaders and organizers, while others make staunch workers when organized and directed. We need leaders in this movement. Therefore, the services of several enthusiastic and energetic blacksmiths can be used to good advantage in every State, and we should be glad to hear from any such who could devote some, or all, of their time to the work of getting the smiths in their respective States and Counties in line.

Special Announcement Concerning the April Issue.

The publishers have decided to make the April issue of THE AMERICAN BLACKSMITH a special spring trade number. It is not proposed to do this by decorating the cover with gaudy colors, but to maintain the same general form which each issue of the journal at present has. The material for the reading pages will be selected with more than usual care and with special reference to making it an unexcelled number.

In addition, it has been arranged to include with the April number, as an art supplement, a reproduction in twelve colors of the splendid picture painted

for THE AMERICAN BLACKSMITH by Raphael Beck, and entitled "The Village Smithy." This will be mailed with the April issue, free of charge, to every regular subscriber. If you or your friends in the craft are not already on our lists as subscribers, you should by no means miss the special opportunity which is thus offered, and you will make no mistake in sending in your name at once for your yearly subscription, to begin with this issue. Special inducements are also offered for immediate subscription, as you will see by referring to the advertising columns. The picture will be an exact fac-simile, on a reduced scale, of the oil painting itself, the result of the highest skill of the lithographer. It will also be finished up with the canvas effect to make it a faithful reproduction of the original oil painting—a splendid picture for framing, and a most handsome one.

The central figure is a fine looking blacksmith, who is shown pausing for an instant at his work to look up at some children who have just entered the shop. The details are worked out with remarkable fidelity to life, and all who have seen this latest production of Mr. Beck, pronounce it one of the best works of this well known artist. We are very glad to be able to reproduce this splendid painting for the exclusive use of our friends, and, as noted above, will present it with the compliments of THE AMERICAN BLACKSMITH to all regular subscribers.

Artistic Specimens of Wrought Iron.

One of the peculiar characteristics of wrought iron is the wide range over which its utility extends. Endless are the varieties of form and use to which it lends itself with equally good results.

The slender, light effect of a combination of graceful lines in an ornamental iron fence and gate is exactly what is needed to finish off a beautiful residence—to bound the premises effectually without obscuring the view of fine buildings and artistically planned

lawns. There is, however, one strong objection raised to the employment of fine work for this purpose—its extreme brittleness under the action of frost.



A UNIQUE CANDLESTICK OF WROUGHT IRON.

It sometimes even happens that a mischievously inclined person, passing on a frosty night, will crop off a whole row of delicate points from an iron fence, like so many poppy-heads. However, for any but outside fences this objection is of little account.

For interior decoration, wrought iron has a pleasing, antique appearance, entirely peculiar to itself. A vast number of different effects may be secured, too, by the different modes of finish. For example, an ornament in the rough, unpolished state of the metal will look quite unlike a similar one highly polished.

The accompanying engravings illustrate three very interesting pieces of iron work. The first is a delicate wrought iron candle-stick of floral design. The second represents an artistic lamp made with globe-support. For this photograph, we are indebted to Mr. C. D. Hampson, of St. Louis. The third engraving is after a photograph of a small iron residence-gate, from the forge of the George B. Meadows Wire, Iron and Brass Works Company, Limited, Toronto, Canada.

Kinks and Conveniences in the Wagon Shop.—1.

BY D. W. M.

The setting of axles, which have been bent in an accident, is a frequently occurring job in any shop where repairs are done on carriage work.

To take off all the clips, remove the axle from its wooden cap or bed and put it in the fire to heat, not only spoils the paint, but also the quality of the steel in the axle. It also involves so much

time and labor, fitting the axle to its bed and getting the correct "set," that modern workmen with any up-to-date ideas avoid it by using a much simpler process. Since axle-makers have learned to use a tougher steel and the "converting" process has taken the place of the old "case hardening" for axle arms, they are less brittle and therefore less liable to break. A number of hand tools are sold nowadays for setting axles cold, most of them on the principle of thumb-screw or hand-screw pressure. Some of these tools require the wheel to be removed while the tool is adjusted to the arm and stock, and the pressure is exerted just back of the collar. With an axle-gauge, set to the axle-arm at the other

side of the vehicle, to use as a guide, the bent arm is brought to place. Other tools permit the wheel to remain on the axle. The idea is that the axle is more liable to remain true, and not bend when confined in its box than when out of it, and less liable to bend just forward of the collar instead of behind it. Hence, many prefer to leave the wheel on the axle. By measurement of track, and diagonally from butt of hub to upper edge of tire on both sides (that is, right and left wheel), it is found whether the axle is set properly or not. These are convenient tools to have. Both kinds will be found useful at times.

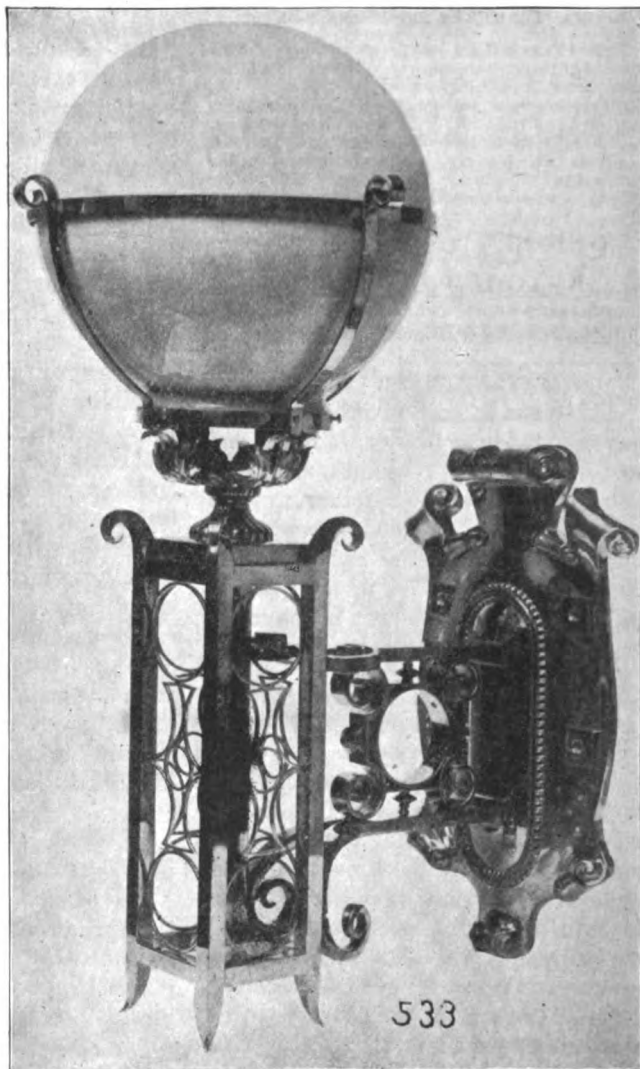
To set an axle cold on the anvil often does irreparable damage. Sometimes the thread end of the axle will fly off, cracking at the last thread groove. Sometimes the axle-arm itself will crack and fly off at the shoulder, or at some point where a deep scratch has been made by a grain of sand getting into the box.

In case the thread end drops off, there is a tool made which will be found very

convenient. It drills a hole in the end of the axle, cuts the thread in it and on the plug, which is to be screwed in very tight. It also cuts a thread any size to fit the axle-nut.

Where no axle setting tool is at hand for setting axles cold, the following device may be rigged up in any shop, and will be found not only effective and rapid in its work, but convenient. It is necessary, however, to have floor space enough to accommodate a vehicle, which any carriage shop must have in any event.

Two eye-staples are fastened firmly in the floor, far enough apart to permit of use on both sides of a vehicle at once: A strong wooden lever, properly ironed with a hook at one end, a wooden



LAMP AND GLOBE SUPPORT WORKED OUT IN WROUGHT IRON.

block hollowed at one end to permit of fitting on the hub-band and covered there with leather to prevent its bruising the paint. A chain with hooks at one end (but with the inside of the hooks square to permit fitting firmly

around the axle without slipping and bruising of paint) and an 8-hook complete the outfit.

When the vehicle is run into place, the chain is adjusted, the block put into position either over or under the hub-band, as the case may be, the 8-hook is put on the axle, the lever brought into position, bearing on the block and hooked on the 8-hook, and the axle gently bent into position. If to be bent upward, the chain holds to the floor and the pull is against it. If to be bent downward, the chain is fastened to the axle at the other side of the vehicle, while a wheel board is placed under the axle near the point of bending.

Any shop can provide itself with this set of tools and it will be found powerful enough to bend the heaviest axles. Moreover, the bend is confined to a point just back of the collar. By using a longer chain, a forward or backward bend can be made just as readily as upward or downward, but it may be found necessary to use a brace to prevent the gear swinging around, which is easily arranged, propping it against one of the eye staples. This set of tools is not like a compact tool, and cannot be taken anywhere, but it has its uses and is very effective and free from some of the defects which all the small hand tools have.

(To be continued.)

Talks to the Jobbing Shop Painter—1.

M. C. HILLICK.

The Uses of Chamois Skins, Pumice Stone, Rubbing Stone, Water, Etc.

An appreciative reader of THE AMERICAN BLACKSMITH desires to know how to use the above named material so as to make a smooth surface. It must be understood, of course, that these materials apply to only part of the problem of making a surface smooth. Lead and roughstuff coats, and varnish coats, are likewise necessary, along with skill of the trained painter in developing a level and smooth surface.

Rubbing stone, or brick, as it is variously called, is a composition material wrought into blocks of different sizes, with which the foundation of roughstuff, usually consisting of from three to five coats of roughstuff, is rubbed to a surface both level and smooth. The Eureka Rubbing Stone is an American product, and may be had in grades running from fine to coarse. The medium grade makes a very nice stone for rubbing a carriage body. Then there is the Schummache Rubbing

Brick, a material of German manufacture, besides an American-made rubbing brick, either of which may be had in various degrees of fineness, and are especially suited for carriage work. These composition rubbing brick and stone have almost wholly displaced the block pumice stone, or lava, which twenty years ago was chiefly used for rubbing roughstuff. The block pumice stone was a crumbly, soft, shelly material, and small particles were continually breaking off and rolling under the block, scratching and gouging the surface, and in the hands of an inexperienced workman all sorts of surface bruises were constantly made. A very fine textured surface can be rubbed with the natural lump or block pumice stone, but it takes expert knowledge and skill to do it. With the rubbing stone or

soft water is indispensable in the paint shop, and especially is it needful in the rubbing of roughstuff and varnish. The pulverized pumice stone or, as it is not infrequently called, pumice-stone-flour, is obtained in numerous grades of reduction, from No. 1½ to No. 00, and even finer. The No. 00 and No. 000 is best adapted for carriage work. Pulverized pumice stone is used for rubbing varnish. Long before the application of rubbing varnish coats, the surface is supposed to be, and should be, in fact, perfectly level. The coats of rubbing varnish are applied for the purpose of furnishing a deep, full body of varnish with which to hold out the finishing coat of varnish and give it a sharp, clear brilliancy. These coats of rubbing are surfaced with pulverized pumice stone and water to make them



SOME VERY ARTISTIC ORNAMENTAL IRON GATE WORK.

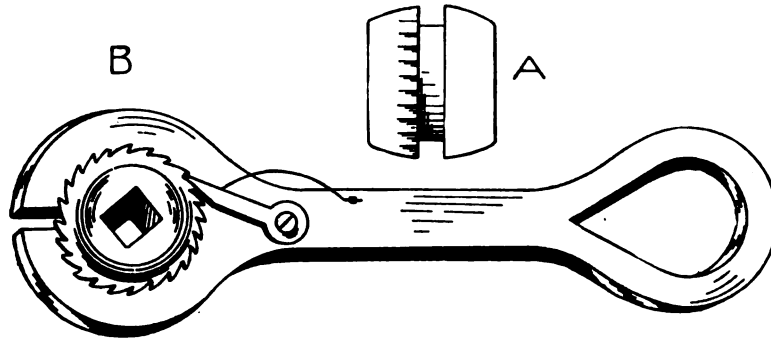
brick, this trouble is avoided, hence its popularity. In rubbing roughstuff with block pumice stone, or with the composition brick, keep the surface washed clean, and use plenty of clean soft water. This prevents the stone or brick from "gumming" up, affords a good cutting surface, and clears the surface of all gritty or gummy substances. A generous supply of clean,

smooth, and give the finish the desired mirror-like effect.

This, then, is the office of the pulverized pumice stone, i. e., to rub down and make smooth the varnish coats. To apply the pumice stone and rub it, heavy felt, or ordinary carriage top cloth, may be used, but the ready prepared felt perforated pads, to be had of almost any dealer in paint trade

supplies, are to be preferred. These pads may be bought in different thicknesses of felt, from $\frac{1}{8}$ to $\frac{3}{4}$ inch. For rub-

mentioned should be kept in dry, clean compartments, away from dust and dirt and careless handling.



A HOME-MADE WRENCH FOR REMOVING TIRE BOLTS.

bing large surfaces without moldings, the thicker pads are best, but for cut-up surfaces, with moldings, the thin and more flexible pieces are handiest. In rubbing varnish or roughstuff, rub with straight-away strokes of the arm, and avoid circular, or criss-cross motions which are liable to disfigure the surface.

The chamois skin is an important part of the varnish surfacing equipment. Under the guise and title of chamois skin, a good many sheep pelts are palmed off upon the unsuspecting painter. The genuine chamois skin is a tough, strong leather, yet very soft and fine of texture, from which the lint is quickly worn. It has to an extraordinary extent the property of taking up water and wiping a wet surface dry. On the contrary, the deftly disguised sheep-skin is loose textured, does not wear well, and will not dry off the surface like the true chamois skin. The latter keeps soft and flexible, whereas the sheep-skin, or any other substitute skin, gets hard and handles badly.

It has been a difficult bit of work to buy a first-class sponge for carriage work, for several months past. A sponge, to be of the best service to the painter, should be a soft, fleecy growth, clean in respect of fibre, and exceedingly tough in texture. In fact, it should be tenacious enough in its parts to withstand plenty of hard service, and yet fleecy enough in fibre to use upon the finest surface. It is economy to buy the best chamois skins and the best sponges. The values of these things are not measured by the prices paid for them.

When used sufficiently to discolor them, wash the chamois skins and sponges in warm water with soap. Then rinse in clean water, squeeze dry as possible and hang away to dry out gradually. In a word, by way of concluding, all the materials above

Intimate knowledge of the materials comes only with practice. Careful attention to detail in each process will, in a short time, build up a firm foundation of experience that will ensure satisfactory results.

A Useful Bolt Wrench and Its Construction.

G. NABLO.

I have seen many wrenches for taking off tire bolts, but none that I like as well as the one shown by the illustration. I will therefore give a description of how to make one, which can be used either for quickly taking off or putting on the nuts on tire bolts.

Take a piece of shaft steel, one inch in diameter, and cut off about $1\frac{1}{2}$ inches. Square the ends and taper slightly, as shown at A. Next drill or punch a hole through the center of the block and follow it up with a square punch or mandrel of sufficient thickness to square the pole all the way through, just the right size to fit the nuts of $\frac{3}{8}$ tire bolts for buggy wheels. The next thing is to cut a groove, as shown at A, and that can best be accomplished by having it cut in with a lathe. It can be done, but not so well, with a mill saw file. Next file in the notches but not quite to the end, so as to have the ends smooth. Next make a shank as shown at B, by using soft steel, punching a hole in one end and enlarging the same to fit the block in the center of A. Shape it as shown. Then cut it open, bend apart, and close on block, as shown. Next fasten a dog with a light spring to keep it in place on shank, and the tool is ready for use. In using, one simply claps the left hand on the block, holding it against the felloe and nut, and with the other hand use as a ratchet. By reversing block, nuts can be quickly taken off or put on as required. This little tool when properly made will be found very useful, and is not difficult to make by any good mechanic.

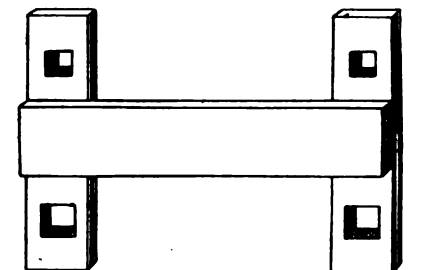
Every smith of any ingenuity has his own particular devices which answer his purposes better than anything else, but the above tool, I think, is sure to meet with approval wherever tried.

A Convenient Device for the Handy Setting of Tires.

A. N. ESTES.

During the hot weather when the buggy tires which have been running a year or so are all loose, tire setting is one of the best paying parts of the smith's trade. It occurs to me to describe my plan of resetting tires for the benefit of those blacksmiths who do not possess a tire shrinker. The tool which I have, I made myself in about two hours, and it works to perfection.

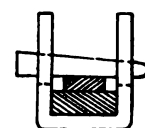
I first take a piece of tire iron eleven inches long, two inches wide and three-quarters of an inch thick. To this at each end I weld a cross piece of the best half-inch Swedish iron, two inches wide by eight inches long, making four wings or ears, as shown in the figure at A. My next step is to punch four holes, those on one side of the main bar being a $\frac{1}{2}$ inch by 1 inch and on the other side $\frac{1}{2}$ by $1\frac{1}{2}$ inches. These holes are to accommodate two keys. I



A



B



C

A NOVEL CLAMPING TOOL FOR SHRINKING TIRES.

next proceed to bend up the ears of the tool, after which I shape the main piece to a circle to accommodate the tires which are to be shrunk. The finished piece with tire in place is shown at B.

In setting the tire, first measure it to find out how much it needs to be shrunk. Take for your starting place the first space to the right of the double hole, or capped joint in the rim, and shrink at this place one-half the amount which you wish taken up. Then change to



THE WELL CONDUCTED SHOP OF JAMES A. HAYES, CHARLTON CITY, MASS.

the right of the next double hole and shrink at this place. In order to do the shrinking with the tool which we have described, take a good heat on the tire and bend it over the horn of the anvil. Place the tire in your tool, drive the keys in tight and then hammer down the bend in the tire, hitting first on one side and then on the other so as to prevent kinking. At C is a cross section of the tool, showing tire held securely in place by the keys binding upon it. This will result in a good job. The tire will be thick only at this place, and is much better than hammering over a kink and then welding it down, as I have seen some smiths do. The latter proceeding invariably results in a burst when running over rough roads. Also, any smith knows how hard it is to cut and take up an old tire without a helper to hold it while you punch the holes. For this reason I think it is much easier to shrink by the use of the tool which I have just described. I can shrink a tire $\frac{1}{4}$ by $\frac{3}{8}$ of an inch in one heat.

The reason you shrink in two places is that your tire will then go back on with the bolts in the old holes very much more easily than if you shrink the tire all on one side, for if you do this, your holes in the tire will miss the holes in the rim nearly all the way around. The buggy tire is one of the most difficult jobs which the smith has to deal with to give entire satisfaction. It may be said that more wheels are ruined by

being improperly set than the public has any idea of.

Take a single buggy which has run for two or three years until the tire needs resetting badly. Some of the wheels will be straight on the face side, others will be out of dish, or have too much dish. The same measurement which will do for one will not do for others, so that great judgment must be used. For a wheel which is out of dish, place it on your wheel bench, screw it down, tighten up your wheel all around and after the rim is well set down on the spokes, saw through one joint with a good, coarse saw. This will make an open joint, so that your wheel will not be rim bound when the tire goes on. You can shrink your tire so that

it is from $\frac{1}{16}$ to $\frac{3}{16}$ of an inch smaller than the rim. Make your wheel and tire so that you can put it back just in the place it came off. Put your wheel on two trestle benches with the face side up. The benches should be placed close to the side of the shop, and a cleat nailed to the wall, high enough above the wheel so that you can put a lever under the cleat and on top of the small end of your hub. By means of such a lever arrangement, you can pry your wheel into dish.

If your wheel has too much dish in it, before you put on your tire, tighten your wheel up and saw the joint as above. Then shrink your tire until your wheel and tire measure just the same. Next put on your tire. In some cases it will dish your wheel too much. Again if your wheel has more dish than it ought to have, say $\frac{1}{2}$ an inch after the tire is taken off, you can have your tire $\frac{1}{16}$ of an inch larger than the rim, or you will dish it so much that you will ruin the wheel, or the appearance of it. Of course it would do some service after that, but it would never be a first-class wheel again.

Shrinking and setting tires,—per-

haps no other job is of more frequent occurrence in the season to come. Many patented devices are advertised for the purpose, of which, like every other patented article, some are excellent and others not so good.

A Prize to the Best-Appointed Blacksmith Shop.

Concerning the up-to-date blacksmith and his opposite—of the Tom Tardy stamp—much has been written and said, but not too much. In fact, not enough can be said to encourage the smith to rise to the occasion and throw off the worn-out customs of old times.

In passing through different cities and villages, one cannot help noticing how varied in appearance are the establishments that bear the name of "blacksmith shop." It is not the size nor the scale upon which business is carried on, but the general air of the place, that makes the difference. A very small shop, whose owner is a poor man (just starting out perhaps), is often absolutely up-to-date and full of life and business. On the other hand, a large concern, owned by a smith of long experience (and set, old-fashioned methods) may have that tumble-down, falling-to-pieces look that indicates a shiftless, neglectful owner. The former is on the ascending track, the latter on the descending, for intelligent management is bound to win.

The accompanying engravings are from photos of two shops that may be



A TUMBLE-DOWN SHOP IN NORTH CAROLINA.

taken as types. The first is owned by Mr. James A. Hayes of Charlton City, Mass. A certain spick-and-span air about this shop indicates a manager of scientific principles. The other cut represents a shop in North Carolina, of which nothing need be said.

In order that the readers of THE AMERICAN BLACKSMITH may exchange ideas regarding the best-appointed shop, a prize will be given to the person sending to THE AMERICAN BLACKSMITH, P. O. Drawer 974, Buffalo, N. Y., a photo, or photos, of the establishment standing nearest the high-water mark of merit. Any one may compete for this prize, whether he be the owner of the shop or not, the only condition being that persons sending in photographs in competition shall be regular subscribers to THE AMERICAN BLACKSMITH. Photographs should be clear and should be accompanied by the name of the proprietor, a brief description of the class of work done in the shop, and a short

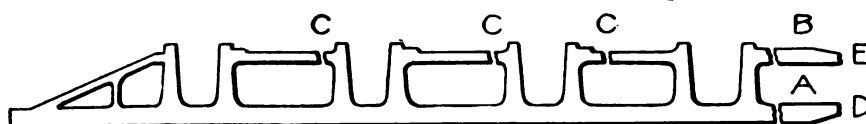


Fig. 24. FRAME OF ENGINE 973, SHOWING FRACTURES.

list of the tools and their make. This competition will remain open until May first. In this connection also, we should like to receive photographs of the poorest appearing shops, those of the unprogressive, tumble-down order. All names will be omitted if such are published, and suitable reward made to the person sending in photograph of the shop which we consider shows the worst conditions. Some of these may serve as a glaring example of how the American blacksmith's shop should not look.

The Railroad Blacksmith Shop.—5.

W. B. REID.

Why 973's Frame Broke.

A new engine, 973, of a large, powerful type, was recently designed and constructed. Although scarcely a year in service, she came into the shop lately badly crippled with a broken frame. The two front toes or rail braces were broken entirely off, and the main braces between the pedestals broken in three places. Fig. 24 shows how it looked.

The companion frame showed no defect whatever. The engine had been in no collision, nor had it suffered unusual shock of any kind. The frame appeared of excellent design, its massive proportions disarming any suspicion of overloading. Why did it break? "It broke of its own accord because it had to," remarked old Jerry Overalls in reply to a query of his gang-boss; and there is probably more significance in the expression than appears upon the surface. A glance at the frame shows

the breakage to be due to two causes: First, too great tension or strain in the back of the frame seen in the long bowl-like sweep of the back. Secondly, careless, inferior workmanship in the welding of the braces, evident in the coarse, brittle appearance of the broken parts, occurring in each instance at the point of the weld. Had these braces been welded thoroughly, they might have resisted indefinitely the tension in the back of the frame. In giving way, they simply allowed the frame to spring back to the original curve left there in process of manufacture. But why this original curve? Many years' experience in locomotive contract shops enables me to answer the question.

Working under a schedule of prices, often affording little if any margin, the frame-maker, as a rule, is not over particular in the methods followed in turning out the work in paying quantities. Quantity rather than quality, the quickest rather than the best methods are naturally chosen, resulting ultimately in expensive frame repair. When welding pedestals in place, it is a common practice to leave a curve the whole length of the back of the frame, calculated to pull straight with the shrinkage of the braces, which in the frame (Fig. 24), are welded in six places. Supposing (which is not always the case) that the first three welds are allowed to cool entirely before the three last or binding welds are taken, this would still leave, at fair estimate, $\frac{3}{4}$ inch of shrinkage. A very slight curve the whole length of the frame would meet this requirement, and, if the braces were substantially welded, probably without much detriment to the frame.

Still the strain is there, and under conditions of hurried production is likely to be excessive; the more especially when we consider, along with this, another bad practice, largely followed, of straightening or lessening the curve upon the back of the frame by hammering or peening the same across the anvil. Heavy forgings whose surfaces are to be planed should never be straightened in this way. The peening simply acts as wedges at the points so treated, affecting only temporary results. The iron will relax and assume its original bend as soon as the surface

is planed. An old frame, whose surfaces are already planed, can be straightened safely in this way. But the tension of an unfinished frame-back, it will readily be perceived, might be doubled by this practice. The excessive curve upon the back of 973's frame (Fig. 24), seems to indicate the conditions that have just been described.

Inferior workmanship in the welding of the braces was also a contributory cause of breakage. The scarfs are often hastily and improperly made. The V plugs are heated or "roasted" to an extreme degree to ensure welding in one heat, while the brace is very often not hot enough. A perfect amalgamation of the parts under such conditions is simply a physical impossibility. The fibre and elasticity of the iron are destroyed, as seen in the coarse, granular or crystalline appearance of the fractured parts, illustrated also to some extent in the conduct of the frame under the tool of the planer, when the iron, following the tool in fibrous, elastic ribbons upon each side of the scarfs, crumbles into granular particles at the points of the weld.

Another element of weakness is the forging of the extension or stub upon the pedestal, to which the brace is welded from the solid. This makes a weak, cross-grain iron where both the weld and bolt hole of the pedestal binder occur (Fig. 24, C). A better, if less speedy, method is to forge the pedestal as in Fig. 25, A, bending the same in the V tool under the hammer,

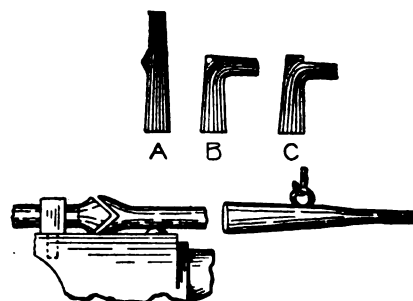


Fig. 25. PROPERLY FORGED PEDESTAL SHOWING UNIFORM GRAIN OF IRON.

Fig. 26. METHOD OF REPAIRING FRONT END OF LOCOMOTIVE FRAME.

B, then cutting out the recess at the top, C. This gives a uniform grain of iron, as shown by the lines of direction in Fig. 25, and carries the weld safely beyond the hole of the pedestal binder. This method, we are aware, may not always be practicable, especially in the case of the extremely heavy frames we are considering, still, it emphasizes the necessity of greater care in forging such parts as these from the solid.

A frame can be made free from strain if necessary time and care are taken. The back should be perfectly straight to begin with and straight when completed. The shrinkage of the braces can be equalized by heating one of the pedestals immediately after making the binding weld in the brace. The pedestal bending slightly towards the brace relieves all tension. An examination of the two front braces, or rail splice, which we mentioned as being broken entirely off (Fig. 24, E, D), showed the iron of both to be exceedingly coarse and granular. The upper brace (Fig. 24, A), being an extension of the frame back, indicates the poor quality of the whole frame. This point is of some interest and importance, showing that mere ponderousness, so characteristic of locomotive frames of recent design, may not be a proof of proportionate strength, compared with the lighter locomotive frames of older construction. And for the simple reason, that the difficulty of working and handling frames of such unwieldy size is likely to result in the quality of the material being sacrificed to weight and proportion.

The same is true of the building of the frame as of the forging of the parts. The examination of many broken frames of this class would seem to justify this conclusion. The appearance of the broken brace (B, Fig. 24), shows it to have been welded by a lap scarf—a very excellent way if properly done. But here also, we find the proof of hurried, careless work. Part of the surfaces have that glazed slaggy appearance, familiar to the smith, where a weld has been attempted with imperfect, dirty heats, a few patches, here and there, of a clean, broken, fibrous appearance, showing how slenderly the parts had been held together. The weld was made under the steam hammer. The parts being dirty, and probably poorly scarfed, slipped beneath the blow of the hammer. After a short time in service, this brace broke at the weld, throwing the whole burden upon the upper brace, which, being of poor

quality, also broke, as shown in Fig. 24, A. A contributory cause of weakness was the presence of a large, tapered, splice bolt-hole.

Jerry Overalls was right, 973's frame broke because it had to. It was built that way and sooner or later the result was inevitable. We repaired the frame as follows:

The back was first straightened. The braces were then welded. After each binding weld, a good heat was taken in the centre of the brace and a heavy square bar of iron wedged between the pedestals. This stretched the brace, in cooling, sufficiently to overcome the shrinkage. For the repair of the front end, two new pieces were forged, scarfed and welded with separate heats, as in Fig. 26, which shows the frame laid upon its side, lengthways, across the anvil-block; the pedestal braced

he also modestly states that he thinks he has lots to learn yet.

Fuel Costs of Power.

BILLY BUNTZ

Power will prove beneficial in any shop. It makes work easier, quicker of performance, invites trade, increases the output and enables the user to meet competition. To be *economical*, however, much depends upon the *kind* of power. Some prime movers cost more for maintenance than the hire of labor for running small machines by hand, and, of course, with such, a man's pocket-book needs a tonic.

This is where the fuel cost of power comes in. In order to prove profitable, a power must be not only inexpensive as to repairs, but *economical in fuel consumption* as well. This fuel economy amounts to considerable, even in a small unit, as one kind of engine may burn fuel costing a couple of dollars or more a day, while another may be only one-half or one-third as expensive. Using an engine which is costly in fuel is like having a pocket with a hole in it. Unfortunately, however, a fuel-glutton can't be choked off. It is therefore well when contemplating the installation of power to consider the practice of other folk and profit by their experience, rather than buy any kind of power and discover you have made

a mistake when it is too late to change.

The cost for fuel per horse-power per hour or day in some cases is difficult to practically compute. After it is figured, it usually comes out differently in practice. In order to figure the fuel cost of a steam engine it is necessary to know the price of coal or wood, its quality or the number of heat units a certain quantity of it contains, the area of the heating grate, the kind of feed-water heater, the draught or smokestack, the number of flues, the size of the boiler, etc. When these are accurately computed and the engine installed; a coal strike sends prices up into the garret, and you are burning a lot of money for very little service. This is to say nothing of cleaning flues,



SHOP OF MR. SANFORD HILL, PEEKSKILL, N. Y.

against a square block, in the hole of the anvil, to resist the blow of the ram with which the parts are driven together. Two good, slow side heats completed the job.

A Typical York State Shoeing Shop.

The accompanying engraving shows a very neat shop, being a reproduction of a photograph sent us by Mr. Sandford Hill, of Peekskill, N. Y. The shop is 21 by 40 feet, with an addition in the rear of 20 by 20 feet, where the stock is kept. The shop runs two fires, and is principally occupied for shoeing work. Mr. Hill states that he has had nineteen years' experience, making a specialty of road and race horses, but

raking clinkers and waiting on steam. A steam engine transmits to the driving pulley only 10% of the fuel energy which the coal contains, while the gas engine transmits about 35%.

With wood at only \$2 a cord, a year ago a smith in a Missouri town was operating a steam engine at a cost of 75 cents a day for fuel alone. He found it profitable to give it a rest by installing a gasoline engine, the fuel for which cost him but 25 cents a day. Pirtle & Co., of Wilsey, Kan., who have a 2½-horsepower Weber engine, say they have used it eight months whenever needed, in pulling an emery wheel, drill-press and other small machines, at a cost of only \$5 for gasoline. Surely no cheaper power could be desired.

Electric power is a little fancy for the small shop, as the average smith knows little about electrical appliances. Then again, a generator has to be used, and a generator requires power to run it. In the cities the current is furnished by a power plant at a cost of several cents per kilowatt (equal to 1.34 horse-power) per hour. As the charge schedule for electric power is generally arranged on a sliding scale, which makes the cost higher for small quantities than for large quantities, the small shop gets the higher end.

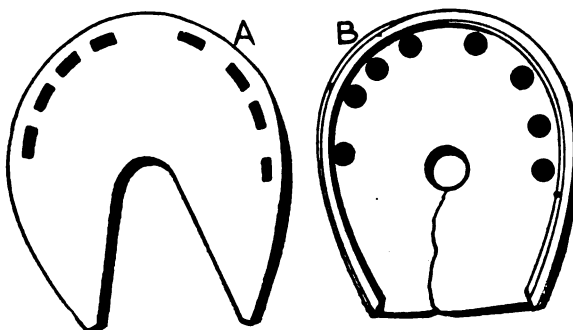
The charge for current in several cities is here given, being figured on a horse-power basis for convenience.

In Philadelphia the charge for current is at the rate of 7½ cents per horse-power per hour. Thus, a 2½ horse-power would cost 18¾ cents per hour, or \$1.87½ for 10 hours' run. However, a discount of 33½ per cent. is allowed where the current is used all day, which would make the net charge of \$1.25 per day. This is a fair average of running a shop by motor. In St. Louis the charge for current is at the rate of 6 cents per horse-power per hour, or 60 cents per horse-power per day, which would make a 2½ horse-power cost \$1.50. In Minneapolis, electric current costs 7½ cents per kilowatt for the first two hours; 5 cents per kilowatt for the next three hours, and 2 cents per kilowatt for the next five hours. In Portland, Ore., the charge is at the rate of \$9.50 per horse-power per month, or \$23.75 for 2½ horse-power.

Those gas engines which have a mixer for vaporizing the gasoline into gas are the most economical on gasoline. The consumption by a small engine is only one gallon of gasoline per horse-power

per ten hours, or 2½ gallons a day for a 2½ horse-power. This is assuming that the engine is running all day long. If it is used only half the time, the consumption will be only half, or if at times the engine is pulling only one or two small machines requiring, say one horse-power, the consumption by a 2½-horsepower engine would be the same as though the engine were of only one horse-power, the extra power being held in reserve by a governor. Consequently, the cost for gasoline is proportional with the load the engine is pulling, and the smith gets the benefit of receiving power at a cheap rate.

The cost per gallon for gasoline varies in different cities. In Minneapolis it is 12½ cents a gallon when delivered by a tank wagon, or 15 cents a gallon by the barrel. In Hartford, Conn., gasoline is 14 cents a gallon; in St. Louis, 12 cents; in Portland, Ore., 19½ cents.



TURKISH HORSESHOES. A, STYLE USED TWO CENTURIES AGO. B, SHOE NOW USED IN TURKEY.

It costs more to run on gas than it does on gasoline. The consumption of city gas by the best gas engines is about 25 cubic feet per horse-power per hour. Thus, a 2½-horsepower gas engine would consume 62½ cubic feet per hour, or 625 cubic feet in ten hours, which, with gas at \$1 per 1,000 cubic feet, as it is in most cities, as in Philadelphia, St. Louis and Hartford, Conn., would cost 62½ cents per day, or about one-half as much as electric power.

Aside from the fuel cost of a gas or gasoline engine, with an engine of this kind the smith has his own complete power plant, which, being a simple one, he can handle it easily, starting up or shutting down as many times a day as he likes.

Herman Schmidt of Hanover, Kansas, says his 2½-horsepower engine costs him only about 20 or 25 cents a day for gasoline. The engine is in the cellar and is belted to a shaft near the ground, thence to a countershaft near the ceiling, and from it to a second countershaft. There are 12 pulleys

carrying 500 feet of belt and driving the following machines:

Little Giant trip hammer, made by Mayer Bros., Mankato, Minn., emery wheels, band saw, forge blower, grindstone, disc-sharpener, drill-press, turning lathe and a 7-inch buhr feed mill.

Mr. Schmidt is delighted at receiving so much power at so little fuel expense, and says he will gladly give information about his shop to anybody. He says his Little Giant Hammer is all right, and he thinks it the best for the smith shop. It requires only about one horse-power, he says, and a gas engine is just the thing for pulling it, together with other machines.

A Price Schedule from Arkansas.

The following is a list of prices and costs, which prevail at the present at Western Grove, Arkansas, as sent to us by O'Daniel & Price of that place.

Shoeing, No. 1 to No. 3,	\$ 0.70
Shoeing, No. 4 to No. 6,	1.00
New tires, each,	35
Setting old tires, each, . .	.20
New buggy tires, each, . .	1.00
Removing and filling, per	
spoke, . . . . .	.15
Sharpening straight plows, .	.05
Horseshoes, cost in shop,	
per pound, . . . . .	.04½
Toe steel, . . . . .	.04½
Store nails, per pound, . .	.14
Piedmont coal in shop, per	
ton,	14.75

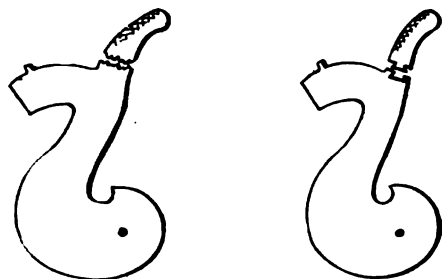
The Turkish Horseshoe, Old and New.

Different nations employ very different devices to serve the same purpose. It is interesting to notice these differences and to trace the reasons for them.

Mr. M. Raeplinger, of Church Creek, Md., sends us a model and an interesting description of the Turkish horseshoe. He has his information at first hand, describing what he himself has seen. It is interesting to note that, although Mr. Raeplinger is a blacksmith over fifty years of age, and eight years ago had never heard a word of English, he can now read and write the language very well.

In Bosnia, Turkey, the horses in common use are ponies, consequently the shoes are very small. Where our horses are shod with a rim of iron, which leaves the center of the sole uncovered, the Turkish shoe consists of a solid disc of iron, with a small rim welded on around the curved edge, as shown at B. A circular hole in the

center, of about half an inch in diameter, runs out in a slit to the back of the shoe. This hole and slit enables the smith to adjust the shoe, shear-fashion, to the pony's hoof. Eight nail holes appear around the front of the shoe, by means of which it is fixed to the foot.



REPAIRING A BROKEN GUN HAMMER.

These shoes are made by machinery, says Mr. Raeplinger, as it would not pay a smith to make them by hand. But the oddest part of it all is that the horses are shod only upon the fore feet—the Turk considering that enough to protect the horse's hoofs from stones and stumps.

In olden times the Turks made their horseshoes somewhat differently. The Hungarian farmers sometimes turn up specimens of these old shoes in plowing their fields. At A is shown a Turkish horseshoe, dating back to the year 1683.

Pointers on Flue Welding.

WM. BALDWIN.

As to welding flues, I shall try to give a plain and simple idea of the way I weld them. First of all, I cut my tips about eight inches long. Then cut off the ends of all the flues far enough back to have them good and sound. Heat the end of the long flue and place it over the point of the anvil horn, resting the end on a bench of some kind a little lower than the horn of the anvil. Begin to scarf about $\frac{1}{2}$ of an inch of the flue, so that when you are finished the scarf will be about $\frac{1}{2}$ an inch long. Always scarf a flue in one heat. Care must be taken not to get too high a heat.

After you have scarfed all the flues, begin with the tips, and swell them out over the horn. Next take the flue and rest the scarfed end on the anvil, and the other end on the floor; heat the tip again, and drive on just solid enough to stay on well. See that the tip fits down on the flue tightly on the outer edge. Then lay down again and proceed as before, until you have them all fitted. Next coke enough coal to finish welding all the flues. Make a clean fire, place the flue level in the fire, with a good backing of something solid behind the

flue tip, so as to keep the flue and tip together while in the fire. Now make a crotch out of box iron, or any thin iron, to fit in the hardy hole to rest the flue in. Proceed to heat, keeping wet coal packed tight on both sides of flue and tip, turning until hot all around. Then put on borax. Be careful not to burn, and when you have a welding heat in one place, turn, and hammer lightly and quickly, turning all the time.

I have used this method with great success. When tips are over eight inches long, they are hard to keep in place. Some smiths use a rod through the flue with nuts and washers, but I can tip a flue while I am changing the rod from one to another. All I consider necessary to make a perfect job is a good, tight lap, a good, clean fire, and a great deal of experience.

The Repair of Broken Gun Hammers.

ADAM T. WIBLE.

I give herewith the way in which I mend breechloading gun hammers, and having a great deal of this work to do, thought that it might be useful to some brother blacksmith who would otherwise have to wait until a new one was ordered and run the risk at the same time of not getting a hammer which would match.

To repair the work, I file a dovetailed slot in the old bottom part, hammer out a suitable piece for the top part and notch it to fit the hammer. I then rivet and braze which gives a very satisfactory job.

The Blacksmith's Work in Utah.

J. H. JENSEN.

At your request, I will write a few lines about the different classes of work which prevail here at different seasons of the year. I would say in the first place, however, that I am never idle, for when orders do not keep me busy, I keep myself busy, stocking up with clevises, wagon wrenches, king bolts and queen bolts, such as are called for during the busy months.

February is my dullest month, and, as a rule, there is little work in March, although this month is somewhat better, as some wideawake farmers bring in their work at this time, before I am extremely rushed. April is a busy month, as a rule, for the farmer is putting in his crops, and the plows, harrows and seeders must be taken care of. There is still a good deal of plow work in May, and some wheel work also.

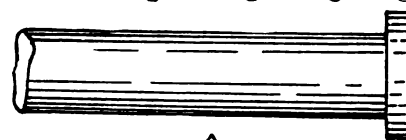
June, as a rule, being quite hot, there is considerable tire work, and also mowers, horse-rakes and derricks to be repaired. In July, tire work principally prevails. I have sometimes reached as high as fifty a week besides wood work and other odd jobs. August is about the same as July. I also have thrashers in these two months to look after. September is a good month for tire work, and the last part of the month some plow work also is brought in. In October tire work and plow work occupies the most of my time. In November I have a slight amount of tire work. In December, which is one of our winter months, I do considerable work on ice tongs, but of late years have had little or no sleigh work. January has been very good with me this winter and I have built one pair of bobs, and a hay derrick, besides other odd jobs.

There is always a whole lot of different kinds of work throughout the year which are too numerous to mention. My work is of a varying nature.

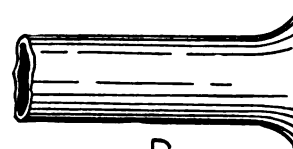
Flue Welding.

JOHN KOLSTROM.

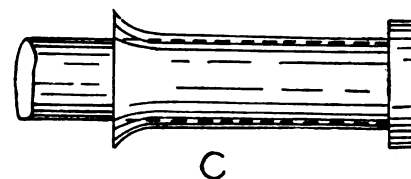
I take a piece of steel shaft about ten inches long and large enough to go



A



B



C

A VERY GOOD METHOD OF WELDING FLUES.

into the flue. To this I weld a good, strong head, as shown at A. I next take a new piece of flue, cut it in lengths of seven inches, opening the ends while hot, and scarfing them, as at B. I next thin the old flues, not shown in the figure, so that they will easily go into the scarf on the short pieces, B. Heat the mandrel and place the short piece on it as shown at C. Then drive the old flue inside the piece B. Next tap the edges down with the hammer, take a good heat with borax and tap with a light hammer while you are turning in the fire. Use a small, strong fire.

The Things to Talk.

ELLA WHEELER WILCOX.

Talk happiness; this world is sad enough
Without your woes. No path is wholly
rough;

Look for the places that are smooth and
clear,

And speak of those to rest the weary ear
Of earth, so hurt by one continuous strain
Of human discontent, and grief, and pain.
Talk faith; the world is better off without
Your uttered ignorance and morbid doubt.
If you have faith in God or man or self,
Say so; if not, push back upon the shelf
Of silence all your thoughts till faith shall
come;

No one will grieve because your lips are
dumb.

Talk health; the dreary, never-changing
tale

Of fatal maladies is worn and stale.

You cannot charm, nor interest, nor
please

By harping on that minor chord—disease.
Say you are well, or all is well with you,
And God will hear your words and make
them true.



Cheer up! Winter is on the wane.

How many dollars lost last year by
bad debts?

A good blacksmith is greatly needed
at Shindlar, S. D.

What's your opinion about your present
prices for work?

The country shop now begins to sing
a song of plow shares.

Have you profited by the universal
opinion regarding power in the shop?
What kind have you adopted?

To run down a competitor shows only
that you have to convince people, by
words, of your own superiority.

Do not be content to sit still half way
up on the ladder of success. Other people
who keep on climbing will walk right
over you.

Pride yourself on keeping your shop,
or your particular part of it, neat, clean
and tidy. It may take a little effort, but
it's worth while.

Under which head will you enter the
photographs of your shop in our prize
competition—the best-appointed or the
worst-appointed?

The blacksmith's apron was used by
King Arsaces of Persia as a sacred banner
in B.C. 250, and was called by the Persians
"Darafsa-I-Kawani."

Are you in line for a copy of "The
Village Smithy?" All subscribers will
receive a splendid reproduction of this
handsome painting, by Raphael Beck, as
an art supplement with our April issue.

Horseshoeing at the "Village Smithy"
is the subject of two of the largest and
most beautiful tapestries in the Palace of
the Escorial, Madrid, Spain.

Our grandfathers had none of today's
advantages in the way of improved tools
and labor-saving devices. Are you doing
any work just as your grandfather did it?

King of his own dominions, however
humble, is the shopowning blacksmith.
The man who works for an employer all
his life, even at a higher wage, never at-
tains to this position.

New blacksmith fires will be installed
by the Canada Switch and Spring Com-
pany, Montreal, Quebec; The Thomas
Wright Company, Jersey City, N. J., and
Mr. T. Hoffmire, Bloomington, Ill.

New fires will be put in by the follow-
ing firms: Schenectady Railway Com-
pany, Schenectady, N. Y.; Risdon Iron
and Locomotive Works, San Francisco,
Cal., and Robert Holmes & Bros., Dans-
ville, Ill. Signs of good times.

The approach of spring—the opening
up of the year—must bring to mind the
work of last spring and lead to compar-
isons of present methods with those of last
year. Are they favorable? What im-
provements do they suggest?

A new factory for the manufacture of
wagons, sleighs, etc., will shortly be built
by Mr. E. G. Gensmer, Sauk Center,
Minn. The Great Lakes Engineering
Works, Detroit, Mich., are also about to
equip their blacksmith shop.

The smith's vocation indicates the
trend of civilization's progress. In olden
times he fashioned the sword, shod the
war horse, and renewed the dungeon
chains. Today he makes the plow, shoes
the dray horse and repairs the intricate,
new farming implements.

The foreman blacksmith is not always
he who knows the most, but is rather
chosen for his ability to handle his men
most intelligently, and to plan the execu-
tion of the shop's work to the best ad-
vantage. Those who use their heads go
quickest to the front.

The blacksmiths and helpers em-
ployed by the Chicago Shipbuilding Com-
pany at South Chicago followed the
example of the boilermakers, iron ship-
builders and ship-carpenters recently and
went on a strike. The unions demand a
nine-hour day with advanced wages.

Catalogues tell the tale of improved
tools and advanced ideas. Write to the
manufacturers in your line and get their
latest publications. They are always
glad to send them, and even if you don't
intend to buy at once they are a good
thing to have on hand, if one wishes to
keep in touch with new ideas.

Are you interested in the American
Association and its campaign for lien laws
and higher prices? Full information for
starting County Associations will be fur-
nished to any smiths in counties where
such organizations do not exist. By such

plans the benefits of mutual agreement
among the smiths can be secured. Even
if only a small start be made, the advan-
tages will be most apparent, and the or-
ganization be gradually worked up to in-
clude every shop in the county.

A jack-of-all-trades many a blacksmith
must be in order to undertake all the jobs
brought to him, but there is no reason
why he should be "master of none." One
special class of work is always more
to his liking and more in his line than
others. He may have just a little trick,
peculiar to himself, of turning out
a certain piece of work. In the midst
of the widest diversity is always a
chance for making a special study of some
given branch. It pays to excel even in
one small kink; for this is an age of
specialists. Look out for your speciality.

Is there any one of our readers who
does not approve of the American Associ-
ation of Blacksmiths and Horseshoers, its
aims and purposes? Thus far every one
has spoken in favor of it—and why not?
Every honest, hardworking blacksmith
should be insured against bad debts by
lien laws. He should get his money for
the material and labor put into the work,
together with his small margin of profit,
promptly and without fail. He should join
with his associates and command greater
respect by advancing and maintaining his
prices for work proportionate to present
increased cost of materials and living ex-
penses. If this is not done, the shops that
are always busy, whether the times are
good or bad, make more profit in dull
times than when the whole country is
prosperous, which is a condition that
never should exist, and which should be
remedied.

He reasons like a lawyer, does Tom
Tardy. When asked, the other day, how
and why he did work so much cheaper
than other smiths, Tom replied, "Well,
you see, it's just this way." Then he
went on to tell how there are three other
smiths, all within short distance of him,
and the four of them have each been try-
ing to secure the balance of the trade.
Tom found himself falling behind in the
race—in fact, he said he had no trade at
all. So instead of finding out wherein
lay the superiority of his rivals and set-
ting about to excel them, he commenced
to cut prices. To make a living thus, he
was obliged to buy the cheapest materials
on the market, and repairs and improve-
ments in the shop became out of the
question. Being unable to afford any
help, he cannot take time to do really
careful work. This cheap system at-
tracted a certain class of "cheap Johns,"
who now have become Tom's established
patrons.

And so he jogs along, living from hand
to mouth; and so he will continue, until
one fine day his business will just go out
of existence like an old burnt-out candle.

This is entering the field of competition
from the wrong end. If Tom Tardy had
set a high standard with high prices, high
class materials and work, he might have
gained a high class patronage—people
who want good work at any reasonable
price, and the other three smiths would
have had to look out sharply for trade.

American Association of Blacksmiths and Horseshoers.

Aims, Notes and Suggestions.

The American Association of Blacksmiths and Horseshoers has been duly incorporated under the laws of the State of New York, and by reason of such incorporation has now the necessary authority to institute, organize, and grant charters to local county associations in any or all States of the Union. As to the name, we wish to explain that it is intended to include every branch of the craft allied to blacksmithing, or going under that general name, such as wheelwrighting, wagon or carriage building, general repairing, horseshoeing, blacksmithing of every kind and class.

The movement now on foot under the auspices of the above named Association needs but little introduction to the regular readers of THE AMERICAN BLACKSMITH, but as this issue of the journal will go to many craftsmen hitherto unacquainted with the work now being instituted for the benefit of the smiths of this country, it is thought best to recapitulate the points which have been told in preceding issues.

The American Association of Blacksmiths and Horseshoers has been formed for the purpose of promoting the material, every-day welfare of blacksmiths, horseshoers, wheelwrights and repairmen. There are many much-needed reforms and benefits which cannot be secured by individual effort, but which the united and concerted influence of the craft as a whole should be able to gain without question.

The Lien Law.

The smith, whether he be a horseshoer, blacksmith or wagon builder, is usually obliged to make his payments for stock to his supply house or dealer within a comparatively narrow margin of time. When, on the other hand, he comes to put his time, labor and material into work for customers, the pay to cover this and his small profit should by every right be forthcoming with equal promptness from the customers, in order that the smith may meet his bills as mentioned and provide for his own living expenses. Such, however, is not always the case, and much money is totally lost by the smith's inability to realize on bad debts. In order to collect this, many measures are adopted, some more or less effective, but few affording the absolute certainty of collection and protection which the craftsman should have. Other trades have what are termed Lien Laws, which allow the

craftsman to put a lien on the article which he has worked on and thus secure payment. In Minnesota also the blacksmiths and horseshoers have the protection of the Lien Law. They can file a notice of lien at a cost not exceeding 25 cents, and proceed to collect their pay, all the cost of such action coming out of the man who owes the bill.

The great benefit from such a law is readily apparent, and it only remains for the craft, itself, to see that it is passed in the respective States. It is the purpose of the Association to direct and organize the efforts of individual members, to enroll them under one banner, working with this end in view. Your efforts are needed, and we feel that it will surely be lent in view of the great saving which such a measure means. No other mechanic in the world works harder with his head and hands than the smith, and he earns every penny that he gets. Therefore, he is more than rightfully entitled to legislation to protect him from "dead beats" and to enable him to collect money which is due. It is often well to refuse work for which the pay is doubtful, but it would be far better to do all the work offered, and under the protection of a Lien Law so that there will be no question about the money. There is no doubt of the many advantages of such a law. The thing is to get it passed in every State. We have set about doing this; we need your help and you need ours. There are practically no objections to be raised against such legislation, and few oppose it. The united influence of the blacksmith craft is the principal thing required, and it will cost but comparatively little effort on the part of each individual smith. The further details will be explained to those interested as the matter takes shape.

Higher Prices for Work.

The price question is also a most vital one at the present time. In spite of the fact that the cost of material and living expenses have been on the increase for some time in the past, in most districts, the prices which the smith is charging for his work are the same as they have been for years. As a result, in these days of prosperity the smith is in reality getting less instead of more money, as he has to work harder to obtain a certain amount of necessities and comforts to live, for himself, and those depending upon him. This is radically wrong. The most apparent reason why prices have not been generally advanced for the work of the smith is because of a lack of co-operation,

organization, mutual agreement, or whatever we choose to term it, between the parties whose interests are involved. From all over the country we hear of wages being increased and salaries advanced, so that it is high time for the smith and his neighbor to come together and agree upon higher prices, which will properly compensate them for their labor. The scheme by which it is proposed to effect this benefit of increased prices is by the formation of an Association in the various counties all over the country; each of these county associations having the power to fix the price for its own district and for that territory only, and receiving a charter from the parent or American Association of Blacksmiths and Horseshoers, but having full control of its own prices and decisions affecting its own welfare. Such associations would be in effect mutual organizations for the purpose of maintaining prices at a proper level. Their aims should be high and the benefits great. In some sections of the country, small organizations of this kind already exist without any connection with a general association. It would be well for associations of this kind to unite themselves with the American Association at Buffalo, if in sympathy with the principles of the general association, and to receive a charter therefrom. Such small organizations should be extended to embody the entire county in which they are located, if this is practicable.

A Good Start Made.

Work has already been actively begun in New York State, and representatives of the Association are at work covering Genesee, Livingston, Erie, Orleans, Chautauqua and other counties at the present time, and all the blacksmiths, horseshoers and wheelwrights of these counties are being visited personally to enlist their influence.

Before this issue of THE AMERICAN BLACKSMITH goes to readers, a meeting will have been held in Batavia, N. Y., for the purpose of organizing the craft in Genesee County, New York. An Association has already been formed in Erie County, in the neighborhood of one hundred strong. The following have been chosen officers of this Erie County Association of Blacksmiths and Horseshoers: President, L. M. Kelly, Lancaster, N. Y.; vice-president, B. Moritz, of Hamburg; secretary, R. E. Davis, of North Collins; treasurer, H. J. Twist, of West Seneca.

At the last meeting of this Association, prices for shoeing were adopted,

which it was agreed should not be changed inside of ninety days. It may be mentioned that as a result of the agitation given this matter in Erie County, a number of the shops advanced their prices for work even previous to the agreement by the Association proper, so that the benefits of the movement are easily to be seen.

Those who are interested in this movement to obtain the protection of Lien Laws and to secure better prices are urgently asked to co-operate with us at once. Reference is made to the blank on page X of this issue, which kindly fill out and return to the American Association of Blacksmiths and Horseshoers, at 453 Washington Street, Buffalo, N. Y., in case you are in sympathy with what is being done and with the purposes of the organization. Enthusiastic blacksmiths, who have their own and their craft's welfare at heart, can aid this work greatly by proceeding at once to get the shops in their own county in line and organize them into a county association for their own mutual advantage. We will be glad to send plans for forming these county associations from this office to any who are interested in the matter, and will lend them our interest and support towards the formation of such county associations. The latter will then receive a charter from the general or American Association at Buffalo. This work of organization can be accomplished very quickly by a few interested smiths in each county, and we would be glad to hear from those who could devote a portion, or all, of their time to work of this nature.

The movement will necessarily go slowly at the start, for all States cannot be covered at once by the representatives of the American Association at Buffalo, N. Y. The movement at first will, as is proper, consist more of a campaign of education and information of what is to be done, to pave the way for active, direct work later. However, it lies within the power of men in every county to make an immediate start, as explained before.

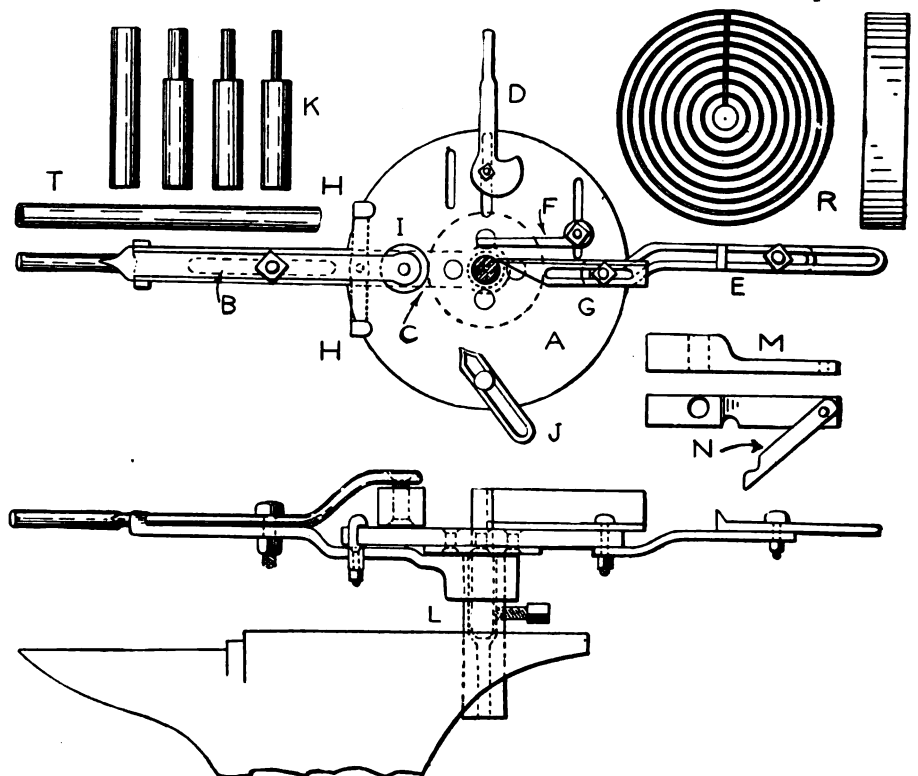
Let it not be forgotten that great reforms and improvements have never been the work of a day. They almost invariably require conscientious, united and persistent work. We are making this appeal for support to all members of the craft, and certainly the support which they can contribute will not equal in any way the benefits which would result if the purposes of the Association are successful. There is

certainly no reason why they should not be. Let us hear from you therefore, sending the blank on page X and telling your own particular views regarding the matter of Lien Law and higher prices. There are several other benefits which will follow as a natural result, wherever a county organization is successfully formed, but the two just mentioned are the principal ones.

An Eye Bending Machine of Wide Range.

The drawings on this page show two detailed views of an eye bending machine, which will do work of an extremely wide and varied character, and

table or bed plate of the machine. B is the lever and C the bottom lever. The part D is a clamping device, which may be adjusted as indicated for different sizes of stock. At E is shown a gauge and at F a clamp plate, which is used for holding the iron; G represents a guide plate made of angle iron, and both these plates are adjustable; H are termed the safety or guide hooks. At I is shown the wheel or roller which is carried on the movable lever, and which is the part that does the bending. A distance gauge is shown at J. King pins of various sizes, as indicated at K, are needed to fit in the hole of the table. L shows the stand or post.



A VERY USEFUL EYE BENDING MACHINE FOR VARIOUS KINDS OF WORK.

which forms a tool of the greatest usefulness for all shops where a number of similarly shaped pieces in the nature of angles, I's and U's, are required from time to time. The construction is such that it allows of ready adjustment for different forms, and the whole is adapted for use by hand on an anvil. We are able to show this handy tool, owing to the kindness of Mr. William Vanderlinden of Chicago, Ill.

The tool will bend from $\frac{3}{8}$ to twelve inches, and from $\frac{1}{4}$ to $1\frac{1}{2}$ inches round iron. It will also accommodate flat iron of the same sizes. It can be also arranged to bend square corners of any size from $\frac{1}{4}$ to $1\frac{1}{2}$ inches round iron, and also can be used for making angles of any degree.

Referring to the figure, A is the

For bending circles of large diameter, an assortment of rings is used which can be slipped over the king pin. These are shown at R. For the purpose of bending square corners, the piece M is employed, which is placed over the king pin with a bolt in the back of it. N indicates the gauge which is used for the purpose of bending "U" bolts. When heavy bending is required, a pipe lever, T, may be slipped on over the end of the shorter handle to secure greater leverage.

This machine is operated very easily, and is quickly set for any work. It is very useful for small orders, and can be used for a vise also, with the clamp lever D.

It must always be an object of every mechanic to combine within a small

compact tool, as many uses as possible. Hence, the wide variety of work to which this tool may be turned must be counted one of its very important advantages.

A Year in an Iowa Blacksmith Shop.

J. G. HOLMSTROM.

The following is an account of a year of work in Caresco, Ia.:

Horseshoeing is carried on all the year around in cities, but in the country there is very little in the summer. From March first to November, wagon work and tire setting keep the blacksmith busy. In March the plow work commences and lasts until June—going on all summer, to some extent, where breaking is done. In August it sets in again and continues until the freeze comes. Corn plows are repaired from May on to July.

Then the harvesting implements are in evidence—mowers and binders—while from the first of June until the middle of July, hay racks, hay rakes, hay loaders, etc., are brought in. Threshing now begins, and thence forward to freeze up the shop is kept going with separators and engines.

Winter sets in at about November, and the smith's work from that time on to March consists principally of sleigh work, varied during February, March and April with repair of seeders and drills.

This is the outline of a blacksmith's usual work during a year in the Northwest.

An Improved Sandboard Plate.

SAMUEL L. ADAMS.

My experience of forty-eight years in Utah as a blacksmith has proved to me that the right style of sandboard plate has not yet been adopted. The round bushed thick cast-iron plate takes out too much timber and weakens the sandboard. It is also a well known fact that the hole in the sandboard plate becomes elongated, and as the plate wears away, the wood on the back side of the sandboard is worn through, and in cases where men are neglectful, a new sandboard has to be made. I think my device will obviate, and save both king bolt, plate and wood. In this case no groove would be cut in the king bolt to render it easy of breaking.

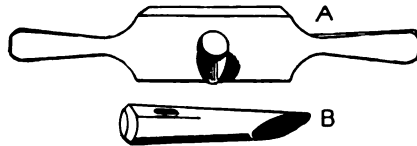
I do not punch a clean hole out of the plate, but I cut one side of the hole and drift the other, thus making the lip that takes the wear of the king bolt on the back side of the sandboard. At

A is shown the sandboard plate looking downward upon the lip, which extends at right angles to the plate proper, and which is from three to four times as long as the plate is thick. B represents the tool to drift the hole. I find it well to have a die plate for use with the tool when punching the sandboard plate to form the lip. The bevel faced punch will crowd the wad to form the lip backward into the die. This any smith will readily understand.

Treatment of Steel.*

H. W. RUSHMER.

This subject has been covered so thoroughly by pens far abler than mine, that all I will endeavor to do will be to repeat and emphasize a few points, which to many appear so small and trifling, that they are unworthy of notice. The great changes wrought in the production of steel and improving the quality at the same time are due, in a great measure, to the attention given



AN IMPROVED STYLE OF SANDBOARD PLATE.

to those things which in earlier years were considered so small and trifling, and which they believed could not have any influence in the final results.

An eminent metallurgist a few months ago forcibly expressed himself on this matter in the following language: "The influence of the apparently little on the obviously great is recognized and we say with Browning:

'Well, sir. The old way's altered somewhat since,

And the world wears another aspect now,

* * * * *
The small becomes the dreadful and immense.' "

Many of the failures in steel which caused so much mischief in the past are being investigated, and it is encouraging to note that nearly all these supposed mysteries are accounted for and in many instances remedies applied.

It is true we still have many failures, but it is generally due to the fact that in our haste we have failed to remember some of the well defined laws governing the conditions.

There being a constant desire to reduce the cost of production, cheaper stock is resorted to which is unsuitable for the purpose, and then the inattention given in treating it is the cause of many

* Paper read before the Chicago N. R. M. B. A. Convention.

failures. It appears to be the impression with some that the cheaper the steel the more abuse it will stand; this is wrong, for in fact, it should receive a better treatment. Those who have had their patience tried by being compelled to use this cheap, carelessly treated steel are apt to lose their confidence in this kind of metals. When they recall the little truism, "true as steel," they say surely it must be a delusion, or they will blame the manufacturer for sacrificing quality for quantity, for his present product will not compare favorably with that of the past. This is a mistake, for we have better steel to-day than ever before, and when we see such intricate shapes successfully hardened and performing work which exceeded all expectations, it speaks well for all concerned.

As chipping chisels are quite a factor in all large shops and at times give an endless amount of trouble, a few words on this subject will no doubt be timely.

The operation of making and dressing chisels appears so easy and simple that it is scarcely given any attention, and many are of the opinion that a cheap grade of steel is perfectly suitable for the purpose. There are various reasons why good steel should be used for this purpose; viz., they must hold a good cutting edge, they undergo many redressings, they are subjected to impact, and they are often used by inexperienced workmen. Cheap steel, when reheated and retempered many times deteriorates very rapidly when compared with good steel. This cheap steel has a very open and loose structure; also, it contains a greater percentage of the impurities; these impurities envelope the grains and prevent the necessary cohesion from taking place between the grains. The vibrations which take place when a chisel is struck a blow from the hammer, are very conducive to fatigue in poor steel, and in this condition a chisel will break in a very short time. These vibrations do not exert such a marked influence on good steel, and furthermore this rule will also apply to iron in the same respect.

In making chisels care should be taken to clip off the corners; if not, they will draw over and overlap the interior metal, which will produce a split point. I believe in edging up, or, in other words, upsetting edgewise when the point of the chisel is very thin, and being at a dull red heat, is the cause of more chisels breaking than any other treatment it receives, unless it be over-heating for hardening. The smith should

aim to do most of his edging up before the chisel is drawn down too thin; if it should spread a little wider than the width of the steel, it would be better to leave it in this shape than to edge it up when it is very thin.

In order to obtain the best results a good hammering to pack the steel is very essential, but it should be properly done. The chisel should be evenly heated and the process of packing should commence at the thicker part of the chisel first, gradually increasing the amount of hammering on reaching the point and aiming to give an equal amount of it on each side. At times we have a difficulty with chisel points snapping off; there are good reasons for these failures. First, when a chisel is unevenly heated and quenched in this condition it is left in a state of unequal tension. Then we find areas with different degrees of hardness, also the transition from the hard areas to the soft being so abrupt, the chisel is left in a state of great weakness. Secondly, the point of the chisel is heated to the proper temperature, but just back of this (say about $\frac{5}{8}$ of an inch) the color is scarcely visible. It is quenched in this condition. This chisel will break at the junction between the hardened and the unhardened parts. The smith will then test the fracture with his file; finding it very soft, he wonders why it broke.

When steel is quenched between what is called the neutral and hardening zone, or in other words just before it arrives at the true hardening heat, it is in its weakest condition, and this accounts for the point jumping off. This can be remedied by hardening the chisel further up where it is thicker and stronger and then drawing the temper accordingly.

A practice which should not be tolerated is when the chisel point is heating too fast and it is checked by dipping it into the water (just for an instant) and then placed in the fire again.

In dressing chisels many are returned having considerable temper remaining; generally they are thrust into the center of the fire; here the change is so sudden that the tenacity of the steel is impaired, and at times will cause surface cracks. The use of sulphurous coal is also quite a factor in causing unsatisfactory results.

It seems almost unnecessary to mention that quick heating and overheating in any part of the treatment is the cause of many failures.

We will make a number of chisels from the same bar of steel and will

declare they all received precisely the same treatment; but, will the final result support us in this claim? I believe not, for there must have been a variation in the treatment somewhere, for the machinist (who is a careful man) will state that some broke very easily, while others were exceptionally good; until we can explain why this is so, we should refrain from upbraiding our friend when he returns with these chisels broken. Many efforts have been made for the purpose of taking a short cut on this undesirable task of chisel dressing, but the old method still prevails to a great extent.

Some have recommended the use of lead, others cyanide of potash, which is heated in a ladle or pot to the proper temperature, and the chisel points placed in this till they attain the desired heat, but if these mediums are not kept at the proper temperature, the results will be very unsatisfactory. Some advise heating the points in the fire, and then quenching in oil or a mixture of tallow, prussiate of potash and resin; then again tin that is just brought to the melting point is used. It is claimed that when quenched in any of these mediums the temper need not be drawn; it will be ready for use. For my part I do not believe that they are worth considering.

Some practice drawing the temper very slowly in oil or sand which is heated to the proper temperature to give the required hardness to the chisel.

It would be well to give a little attention to the water emery wheels in use at so many places at the present time; they are usually too fine for the purpose intended, which causes them to glaze very quickly when used on hardened steel. They are the cause of many surface cracks which we see on the cutting edge of the tools, especially those made from alloyed steel. The tools are thrust against this glazed surface of the emery wheel with considerable pressure, and the wheel will not cut, but glide over the surface of the tool; this friction generates heat so quickly that it exceeds the conduction power of the steel. Consequently only a thin shell of the steel is heated, expansion must take place, but the internal condition of the steel being cold and unyielding this thin shell relieves itself by cracking. Then again tools ground on wheels in this condition will become soft as well as glazed, and this will require hardening again, but this glazed film prevents hardening from taking place,

and we blame the steel for being deficient in carbon. These emery wheels will often take the temper out of the extreme cutting edge, which will not penetrate more than .001 of an inch beyond the surface, but it is enough, for the tool gives down very quickly, and on such tools as mills it is liable to break out the teeth.

In some places when tools are to be annealed they are placed in a furnace that is heated to a very high temperature. This is a bad practice, and should not be continued on such tools as mill-hobs, reamers, etc., for the small teeth are heated so quickly that it will cause a strain at the base of the teeth, and then if the old teeth are not entirely cut away (which is often the case), it will be disposed to crash at these strains when tempered. It is well known that steel on being hardened will change from its original size when cold, and generally an expansion will take place, but it is not unusual to have a piece that will show a slight shrinkage.

At times we will notice pieces of steel which conform exactly to the same size and shape, made in the same manner and from the same bar of steel, and which when hardened will show a slight difference in the expansion, and perhaps a piece or two will show a slight contraction. We feel confident that we heated these pieces the same temperature, but the eye is very easily deceived and every little increment or decrement in temperature to which the steel is heated, or even a change in the temperature of water, will have an influence in producing different results.

These variations being very small, would not count on many pieces to be hardened for ordinary work, but on such tools as master-taps and dies, it would probably render them worthless.

Some blame the steel for these variations, but I believe it is due partly to our method of hardening. The following I have copied from a little book which will partly explain this difficulty: "In pieces of steel, above a certain size, the hardness does not extend right through to the center. The surface, when it is suddenly cooled, contracts to a certain extent, and exerts a considerable compressive force on the metal in the interior, which, as it slowly cools, is forced to occupy a smaller volume than it did originally; whilst the hardened portion, which is in a state of tension, owing to its having been cooled suddenly, occupies a greater. If then the contraction of the interior be greater than the expansion of the exterior, the

piece of steel, as a whole, will be smaller after hardening than it was before, and vice versa. The whole question turns on the relation of the volume of the hardened portion to that which has been only partially hardened.

Diseases of the Foot and Their Treatment.—14.

E. MAYHEW MICHENER, V. M. D.

Treatment of Penetrating Wounds of the Joints.

Injuries which open the cavities of any of the joints are among the most serious of all cases which the veterinarian is called upon to treat. A knowledge of the nature of such wounds, their common causes, and probable results, is of importance to everyone having to do with the care of animals. In no other class of cases is time a more important factor in determining the final outcome of the case, as a delay in the beginning of treatment may, and frequently does, make all the difference between success and failure, recovery or death. The purpose of the following is to indicate, as far as possible in a limited space, the outline of care and treatment of such cases until the assistance of a qualified person can be obtained, or if the situation is such that the owner or attendant must of necessity apply the whole treatment, then to indicate the course to be followed.

The serious or fatal consequences following a penetrating wound of a joint are due to the introduction within the wound of dirt and germs, which cause violent inflammation, causing the formation of pus or matter, and resulting, if allowed to run its course unchecked, in either death of the animal from exhaustion and septic poisoning, or that which is little better, a permanently diseased or stiff joint. Wounds opening the joint may be either punctured or incised. The former are made by the entrance of some sharp object without extensive wounding of the skin. A common example of a puncture is that caused by the entrance of a nail or the tine of a fork. Incised wounds are those in which the skin is cut or torn to greater or less extent, as from wire cuts and kicks inflicted by other animals. Punctured wounds are dangerous, largely on account of their trifling appearance at the time of injury, as on this account such wounds are frequently neglected until the inflammation of the joint is well established. Punctured wounds, if treated early and with energy, offer less difficulty than do widely incised wounds, other conditions being equal.

The symptoms of open joint may not be very apparent at once upon the infliction of the injury; especially is this the case where the wound is small, as from a puncture. At a time varying from a few hours to as many days however, symptoms of pain are manifest; the animal is noticed to go lame or to avoid the placing of weight upon the injured limb, and careful examination of the limb will disclose a wound apparently disproportionate to the amount of pain manifested by the animal; the neighborhood of the wound is hot and sensitive to the pressure of the fingers, and a greater or less quantity of amber-colored and viscid fluid can be detected issuing from the wound. If in considerable amount, this fluid, which is known as synovia or joint water, may collect on the surface of the skin or the hair in the form of a clot somewhat resembling slightly heated white of egg. Frequently the synovia is stained with blood, and after the formation of matter has become established in the wound, it is discharged along with the synovia. Commonly the pain and the discharge of synovia begin about the same time. Unless the case receive early treatment, the pain and lameness become more and more severe, the respiration and pulse become much disturbed, the body temperature becomes elevated from two to six degrees above the normal and the appetite more or less depressed. The animal may become wet with sweat and the face bear an expression of great distress. The animal commonly remains in a standing position as long as his strength will permit it, and, should he get down, will commonly have trouble in regaining a standing position without assistance. In cases in which treatment is successful, recovery may be complete in from a few days to four weeks, or longer.

Prevention.—A few remarks concerning two common and largely preventable causes. The use of sharp steel forks about the stable should be entrusted only to careful men. These forks should not be used in the dark and should never be left where the animals may accidentally come in contact with them. Another frequent cause is from kicks of other animals, especially from those shod with sharp shoes for winter work. The stalls should be so constructed as to prevent one animal injuring another, and each animal should be carefully and securely tied in its stall by a reliable method.

As to treatment, in no kind of injury does prompt and energetic treatment

count for more than in this accident. The first requisite is to keep the wound clean and protected from the introduction of dirt of all kinds. With sharp scissors, clip the hair as closely as possible from around the location of the injury, protecting the wound if necessary from the clipped hair by covering any raw surface with a perfectly clean piece of muslin, which has been saturated with a 5% solution of carbolic acid, or preferably a creolin solution of the same strength. After the whole circumference of the joint has been clipped, the surface of the skin should be washed with warm water and good soap, after which the surface must be dried well by means of a clean towel. While waiting for material for applying further treatment, the surface of the wound should be protected by covering with clean muslin, saturated with one of the above named disinfectant solutions. If the wound is lacerated or is in such condition that it can be closed by the application of stitches, it should be done without unnecessary delay. Sutures or stitches are applied by means of a needle, and the operation requires some surgical skill to accomplish it properly. It is of the greatest importance that the wound be free from all dirt or foreign material when it is closed, as the presence of even a small amount of such substance may defeat the proper closure of the wound by causing inflammation and the formation of matter or pus. Punctured wounds made with small objects require no suturing. They must be well washed and bathed with the disinfectant, and likewise dried with a clean towel.

After the cleansing and disinfection has been completed, and in the case of lacerations, the sutures have been applied, the clipped area enveloping the entire joint should be well rubbed with a blistering ointment composed of Cantharides ointment, eight parts, to which one part of Red Iodide of Mercury has been added. A thin layer of the ointment should be spread over the surface after it has been well rubbed with it. Over the layer of ointment apply a layer of clean muslin, next apply a layer or two of prepared absorbent cotton and over the whole, to secure the muslin and cotton in place, plenty of bandages, which should be rolled in sections not less than three yards in length. To aid in retaining the turns of the bandage in place, the liquid silicate of soda is of great assistance. It is applied with the hand, or a flat varnish brush, to each layer of the bandage, and as it

hardens in a few minutes it keeps the dressing in position. The time which the dressing is to remain on varies with the conditions of the case. Should the pain subside to a marked extent the bandage may be allowed to remain three or more days, if it keeps its place well and there is no other cause for its removal. If pain continues or increases, remove the dressing in one day or less, and should the surface be not uniformly blistered, more of the ointment should be applied where needed.

After the surface has been well acted on by the blister, the after-treatment consists of changing the dressing once daily, or less frequently in cases which appear to be healing without any discharge or much pain. The blister surface should be covered with carbolized vaseline, over which a layer of clean muslin is applied, and then the absorbent cotton and the bandages as in the first described dressing.

Internal medicines may be required in certain cases, but should only be given under the direction of a qualified person. The use of slings to support the animal and keep him from getting down may be required in some cases.

As the case begins to recover, the edges of the wound may show what is commonly known as "proud flesh," or a growth of granulating new tissue. To prevent this from forming in excess and thus causing a larger scar than necessary, these granulations must be kept down level with the surrounding skin. The application of finely powdered burnt alum will serve to do this; it should be applied to the raw surfaces two or more times daily, always removing any loose scab or crust formed from the previous application. The attention to this matter is important in order to save disfigurement of the animal by large scars or callous growths, which may form at the point of injury with great rapidity.

Another and different method of treatment of open joints has given fair results in some cases and consists of cleansing the wound as directed in the foregoing, and then by directing a flow of water, either pure or that in which some antiseptic has been dissolved, upon the wound for periods of several hours daily, or even continuously. The simple water irrigation can be easily arranged where there is a water supply, as in a city, or may be arranged at any place by elevating a barrel or other receptacle to get the necessary head. If a special arrangement of this kind is adopted, it is best to combine some

antiseptic with the water, as for example 2% of carbolic acid or one part of corrosive sublimate to each 2,000 parts of the water. The stream is conducted to the wound through a small rubber tube, the end of which is so secured as to direct the flow upon the wound. A large stream is not required. The irrigation treatment has not given as satisfactory results as the blistering treatment in the writer's experience. Irrigation is to be preferred in certain cases where it has been found impossible to close an extensive wound by means of sutures and the swelling induced by blistering. In punctured wounds of the navicular region, of course, the blister treatment cannot be employed on account of the part being surrounded with the horn of the hoof. In such cases the use of irrigation will be found the only resort.

The whole treatment of open joint can be outlined in a few words: Rigid attention to cleanliness in every detail, rest as absolute as possible, early and decided measures with regard to the closing of the wound. Cases which live through a long period of pain, and result in a stiff joint, are rarely of use for service. In rare instances, certain animals of this kind may be useful for breeding purposes. If the case resist treatment, and suffering is intense, it is generally advisable to end its suffering by death.

(To be continued.)

The Scientific Principles of Horseshoeing.—17.

E. W. PERRIN.

Thrush in the Frog. Ossified Cartilages.

Thrush is one of the commonest diseases of the horse's foot—a disease of the sensitive frog, with which horse-shoers and horse-men are well acquainted.

Thrush is characterized by the following symptoms: A fissure appears in the cleft of the frog, which emits a very offensive discharge. The fissure usually extends to the sensitive frog, thus exposing the vascular structure to the contamination of stable filth and other foreign substances, which greatly aggravate the disease.

Prominent among the causes of thrush, is the absence of that natural stimulus afforded by pressure, which in a normal condition keeps the frog healthy. It is a law in nature, that any organ of the body deprived of its natural function is thereby impaired in health; finally it loses its function from lack of use, wastes away, and atrophy sets in. So,

depriving the frog of its natural function—which is weight-bearing—induces disease. Hence, high calks, which prevent the frog from performing its natural function, are a predisposing cause of thrush.

Next in importance is stable management. Horses' feet must be kept clean to be healthy. The uninformed may argue that horses' feet in the country are not kept clean, and yet

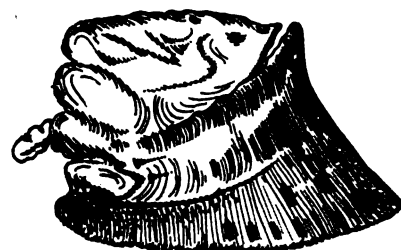


Fig. 89. AN OSSIFIED CARTILAGE, ANCHYLOSED, KNITTED TOGETHER BY BONY UNION.

they are more healthy than the feet of city horses that receive more attention. This is true, but the nature of the work they do and the conditions under which they live are very different. It must be remembered that the wet mud of a plowed field—the cool moist earth of the farm—is a very different composition from the earth of a stable floor, that is saturated with the irritant acids contained in stable filth. Stable filth decomposes the horny frog, causing it to split in the cleft, thus admitting stable filth to the sensitive frog in the same way that a wound in the human foot would be contaminated with dirt if not protected by shoe and stocking. The disease being once set up, the membrane, which in a healthy state secretes the horny frog, now secretes a black discharge, which has a very offensive odor.

Thrush is comparatively rare in well managed stables. In the British Cavalry it is very rare; the horses' feet are picked out and washed every morning, and on returning from drill or duty they are again washed. I point to this fact as showing that cleanliness has much to do with the prevention of this insidious disease. Contraction is also a cause, likewise too much paring. The frog should not be pared except for the purpose of removing ragged, semi-detached horn that harbors dirt.

To treat thrush, first remove all ragged horn that harbors dirt. Sometimes a frog may appear sound, but under the apparently sound surface it is all honey-combed. Don't be afraid to cut away all diseased horn, because the horn once separated does not heal—the fissure in the cleft does not grow

together again. Therefore, since we cannot make the fissure join, we must direct our attention to setting up healthy action in the secretory apparatus which grows the horny frog, so that it will grow healthy horn. With this object in view, cleanse the cleft of the frog with peroxide of hydrogen; poultice the foot for a few days to reduce the inflammation, then syringe into the fissure twice a day the following mixture: Listerine, eight ounces, carbolic acid, two drachms, boracic acid, two drachms. When the inflammation has subsided, use a solution of sulphate of copper or sulphate of zinc. Use this dressing twice daily and tuck a piece of cotton saturated with the solution into the cleft.

Although frog pressure is indispensable to the health of the foot, it is not admissible when that organ is in a diseased condition—inflamed with thrush. Hence, it is necessary to protect it from pressure with a bar-shoe until it grows down solid, then fit the shoe so that the bar rests on the frog; or, if the frog is sufficiently developed to reach the ground with the shoe on, you may obtain pressure by direct contact with the ground with a plain shoe. If there be contraction with thrush it must be treated, for you cannot develop a healthy frog while the heels crowd in upon it. But above all, the feet must be kept clean, to carry out this treatment. To let the horse stand in a dirty stall is labor thrown away, for rest assured that stable filth will undo all your work.

Ossified Cartilages.

Ossified cartilages is, as its name implies, an ossified condition of the lateral cartilages of the foot. While the heavy breeds of horses are more predisposed to this disease, still it is common to all horses and mules that do road and street work. It is often difficult to diagnose it in the incipient stage on account of a part of the cartilage being sunk within the hoof, and the ossification invariably commences on the lower border of the cartilage, knitting it firmly to the os pedis, so that a cartilage may be ossified, even ankylosed—joined by bony union (Fig. 89)—at its lower border, and yet yield to pressure at that part which projects above the coronet. When the whole cartilage is ossified, it is readily felt with the finger, and in many cases the enlargement—calcareous deposit—commonly called side-bones, can be seen projecting above the coronet (Fig. 90). The outside of the front foot is most commonly affected,

sometimes both sides, and I have seen it in the hind feet of draft horses. The early symptoms of ossified cartilages are a rise of temperature, with some lameness, which shows only at the trot, and some soreness as evinced by tapping the hoof with a hammer on the affected side. If both feet are affected the horse goes stiff and steps short, and is prone to stumble.

Hereditary predisposition is well marked in the lymphatic breed of draft horses, but the principal cause is concussion, accelerated by placing the whole weight of the animal on the wall of the hoof only, by contraction and by improper shoeing.

Ossified cartilages are incurable, so that treatment can only be palliative. Rest and poulticing the feet when the lameness is first detected may arrest the progress of ossification, and thus limit its extent, but once the cartilage is thoroughly ossified, it always remains so. With side-bones, as with ring-bones or splints, when the inflammation has run its course and the process of ossification is complete, the lameness subsides, provided, of course, that ossification does not cause ankylosis—bony union of some articulation, thus forming a mechanical impediment to the

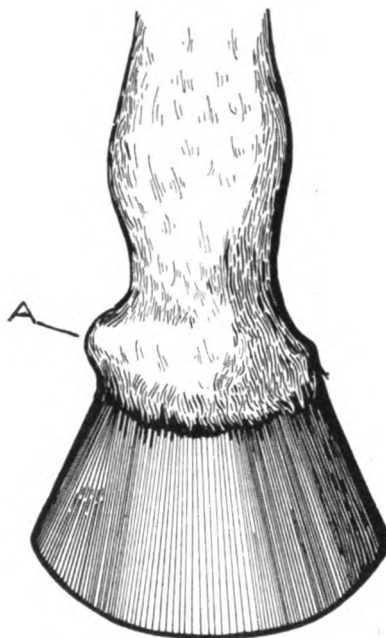


FIG 90. FRONT VIEW OF HOOF SHOWING OSSIFIED CARTILAGE PROJECTING ABOVE THE CORONET.

movement of the joint. In this latter case the lameness is chronic. In shoeing for ossified cartilages our efforts must be directed to making the animal travel with as much comfort as possible. To accomplish this, the shoer must study the needs of each case; for instance, where one side of the foot only is

affected, the horse generally wears very heavily on one side. Don't raise this side with calks, which would add to the animal's discomfort. He wears heavily on the one side in endeavoring to save the side that hurts. Make the heavy wearing side of the shoe out of good steel, the other side of iron, and weld the two halves together at the toe. If you find that your horse travels in discomfort until he wears this shoe to some peculiar shape, observe that shape and follow it closely when next you shoe him. If the hoofs are hard and dry, soften them by poulticing; if contracted, treat for that disease; the pressure of a shrinking hoof on an enlarged cartilage causes great pain and does much to aggravate the disease. There is no system of shoeing so suitable for horses with side-bones as a good, thick rubber pad. In some cases the hoof becomes seriously contracted on the side affected, but this can be prevented by the use of expanders, as recommended in the article on contraction.

There are all sorts of "cure all remedies" advertised to dissolve and absorb bony deposits, such as side-bone, ring-bone, spavin, splints, etc., but I don't know of any of them that will absorb a bony deposit. Prevention is better than cure. We know that concussion is the most potent factor in the production of bony deposits, why not try to prevent it? There would not be half the cases of side-bones if people would have their horses shod with rubber, at least on the front feet. The rubber pad not only affords an equal distribution of weight, but it diminishes concussion to the whole limb, and the less concussion the less side-bones.

(To be continued.)

A Piece of Good News.

Just as we are going to press with this issue, a piece of good news comes to us on good authority. A Lien Law bill has decisively passed one House of the Indiana legislature. We congratulate the craft upon the prospect of securing such a law, and consider it good news for smiths in other localities, showing as it does that protective legislation of this kind can be obtained by proper effort. It is hoped that the movement instituted by the American Association of Blacksmiths and Horse-shoers and backed by THE AMERICAN BLACKSMITH can be made to bear similar fruit in other States.

We should like an expression of opinion from our readers upon this subject. Is the time ripe for a united

effort in your particular State to secure a Lien Law, and will you personally aid in the movement? Send us a list of the names and addresses of all blacksmiths, horseshoers and carriage builders that you know of in your State, and we shall enlist their support.



The following columns are intended for the convenience of all readers for discussions upon blacksmithing, horseshoeing, carriage building and allied topics. Questions, answers and comments are solicited and are always acceptable. For replies by mail, send stamps. Names omitted and addresses supplied upon request.

Hardening Calks—I should very much like to know the best way to harden calks on horseshoes. S. ANDERSON.

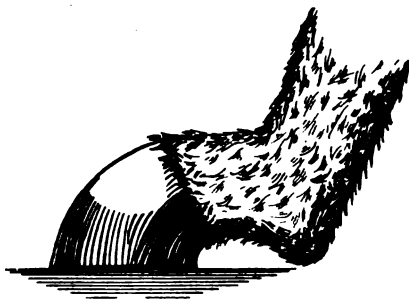
Stock Required for Tires—I should like to know how to find the exact amount of iron to tire a wheel. H. W. BERGE.

A Question on Welding Axles—I should like to know the best way to prepare and weld a steel axle without using the split weld and without boring a hole through the axle. J. M. BEATTY.

To Shoe a Kicking Mule—Will some brother smith please tell me how to shoe a kicking mule? Whenever I lift his front foot he will kick me with his hind foot, cow fashion. C. E. MCKEE.

How Should Reamers Be Tempered?—I should like to hear from some brother smiths as to how reamers should be tempered and prevented from warping. I have a great deal of trouble in keeping them straight. GEORGE RIEGEL.

Shoeing a Cow-hocked Horse—I should like to inquire if a cow-hocked horse, whose foot has been deformed, as



DEFORMED FOOT OF A COW-HOCKED HORSE.

shown in the figure, could be shod so as to raise the foot into proper position, and if so, how? HERMAN HOFFMAN.

Removing Old Spokes—The following way to remove old spokes from the hub is one which I have used for a long time. Make a ring which will slip on the spoke easily and then drive a wedge between the ring and the spoke. By hammering on the wedge the spoke may be easily removed. W. BARBER.

A Few Blacksmithing Questions—Will some brother smith tell me which forge he considers the best? I want one with a deep fire pot. I should also like to know about die holders which can be used in a drill, and if there are any such on the market. I use taps in my drill, and can cut threads in nuts very quickly by holding them with a wrench. Please let me know. CHARLES S. OWEN.

Removing Spokes—To remove spokes I use the common ring and wedge method, but I usually flatten the spoke a little on the back and lay a small piece of band iron on this flattened place. Drive the wedge between the band iron and the ring. If the spoke starts hard place a block of wood or sledge on the under side of the spoke to take the spring. This is my way. C. JEFFERSON.

A Little Testimonial—I have had your paper for a year, and have found it very useful in my business. After working for fifteen years in the city I moved to the country, and not being accustomed to wagon work I found it difficult to handle, but since I have been taking THE AMERICAN BLACKSMITH I have been helped in a great many points and cannot do without it. Please find \$1.00 in payment for the year of 1908. C. WARES, Fort Lee, N. J.

Removing Unbroken Spokes—Replying to a question by Mr. A. Bruton in the January issue as to removing unbroken spokes, our method is to screw the wheel down tight on the wheel-bench, and with a heavy hammer pound the spoke on the top just as close to the hub as possible. This jars or breaks the paint and glue, and by continuing as above the result will be that the spoke will become loose enough to pull out by hand. We have found this method very successful in our shop. O'DANIEL & PRICE.

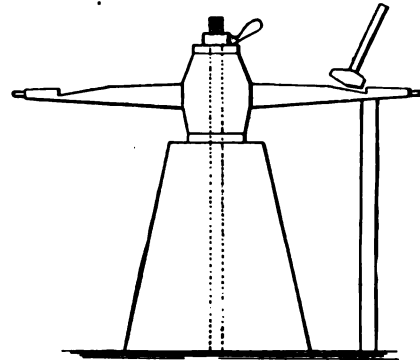
Hardening Reamers—Reamers require the most careful treatment, not only in making, but in hardening and tempering. It is usually well to anneal them before taking the finishing cut. When hardening, they should be slowly and evenly heated to a bright cherry-red, best done in an annealing box. They should be quickly and immediately quenched by immersing in an oil bath, holding the reamer absolutely vertical. Care should be taken to heat very evenly when drawing the temper. B. W.

A Typical Letter from Subscribers—Enclosed find \$1.00 in stamps to pay for renewal of my subscription. I find THE AMERICAN BLACKSMITH a valuable paper for one engaged in that business. I have studied horseshoeing for more than twenty years, yet I find new practical ideas in every paper. I do a general business, have a 5-horsepower gasoline engine, run a feed mill, band saw, emery wheel, and expect soon to put in a circular saw. I find them a great help in the business. E. SWOPE, Morgan Hill, Cal.

Spoke Pulling—I saw in the January issue that Mr. Bruton wishes to know a good way of extracting old spokes. The way I do it is to have an oval ring made out of $1\frac{1}{4}$ by $\frac{3}{8}$ -inch iron, and also a wedge of iron about $\frac{1}{2}$ by 1 inch at one end and tapered to a flat point at the other, making it about $5\frac{1}{2}$ inches long. The ring is larger at one end than at the other for wagon-spokes, the smaller end being intended for buggy-spokes. To use the ring, slip it on the spoke, the wedge applied, and the spoke removed by applying a hammer on the end. W. R. JONES.

Another Spoke-drawing Method—To draw tight spokes which are not broken off, I first bore a hole in the side of the spoke about $2\frac{1}{2}$ or 3 inches from the hub. Take a rod of iron three feet long and large enough so that it will not bend, and insert it in the hole. Next take a piece of tire about $2\frac{1}{2}$ or 3 inches long, $\frac{1}{4}$ inch thick and 2 inches wide, place it against the hub and under the rod about one inch from the spoke. Then by prying on the rod, or using it for a lever, striking on the top and bottom of the spoke lightly, the latter will soon be loosened and can then be withdrawn. G. H. MUSSICK.

Removing Old Spokes—Replying to the question of A. Bruton in the December issue, my method of removing old spokes is shown in the sketch herewith.



A GOOD WAY TO REMOVE OLD SPOKES.

I make a notch in the spoke with a saw and spoke shave, place a support under the spoke just outside the notch to prevent splitting, and drive it out as shown with great success. J. K. RIBLET.

A Home-made Shears—I am very much pleased with THE AMERICAN BLACKSMITH and think it is a very practical paper. I noticed in last November's issue a cut of Mr. C. W. Smith's home-made shears, and having none in my shop I made one. However, I made mine about three inches longer, and instead of the two links at the upper end I made a slight bend, so that the lever attached to it will come in contact with the movable part of the shears. I also raised my bolt up higher at the lower end, so that I can raise the shears up closer to the bolt, and in this way I get more leverage. I cut $\frac{1}{2}$ by $1\frac{1}{4}$ -inch steel without much trouble. I wouldn't be without it. WM. LIGHT.

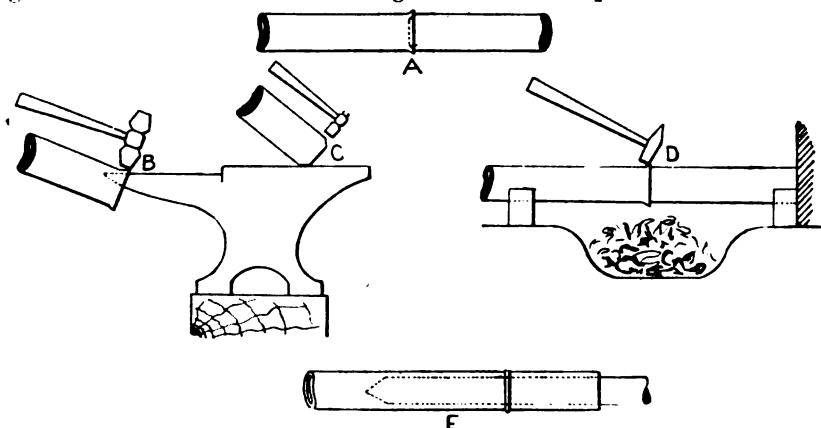
Tempering Stone Hammers—I give herewith my method of tempering stone hammers, in answer to the question of James Davis. My thirty years' experience in this work may prove of some benefit to my brother workman. First heat the large end to a good cherry red, seeing that the center is as hot as the edges. Plunge into lukewarm water, leaving there until cooled off. Heat the other end slowly to a good cherry-red, cool in water as above, $2\frac{1}{2}$ inches, draw temper to a good copper color and cool off. The great trouble in tempering comes from over-heating the steel and not cooling off properly. Any tool having a thick stubby edge should be placed in the water at least $2\frac{1}{2}$ inches and held there a little while, as the slower the temper or color comes, the better. A. J. COOPER.

An Interesting Letter—I am well pleased with THE AMERICAN BLACKSMITH, as there is not a dull page between the covers. The advertisements are attractive and the reading is excellent. I have been hammering on the anvil since 1873, and am

still in the harness looking for pointers, always using the other fellow's methods, if they excel mine. I have endeavored always to keep up to the times, and have usually been able to do so. Eternal vigilance is the price of holding your job in these days, and you have to hustle or the fellow in the next town will get in the lead. Every day adds a little to what we have already learned, and helps to make up the sum total of our knowledge. I find upon looking through *THE AMERICAN BLACKSMITH* that \$1.00 could not be invested to better advantage. A. F. EMERSON.

Welding Flues—In reply to the question of Mr. Ottoson, in the January issue, I would say that I weld flues as follows: The first step is as shown at B and C, using a four-ounce double-faced shoeing

only a common blacksmith fire, blown by a common bellows, and have my tuyere iron set rather deep. I bank the sides of my fire and coke the center, and the fire is ready to receive the flue. I think a blower would be a better thing to weld flues with than a bellows. As for the anvil, will say you only need a common anvil for the purpose of scarfing the old flue. While drawing in the old flue, be sure not to make it any larger, or not as large as it naturally is, as the stub should be drawn to a thin feather edge and drawn large enough to slip over the old flue. Then put on some pulverized borax and proceed to weld by driving the stub endways. When the stub has stuck fast, take an iron hammer with an iron handle in it, and as you turn the flue weld the stub to the old part. Now fasten a man-



HINTS ON WELDING BOILER FLUES.

hammer. The flues are to be shaped in this manner so that they will go in about $\frac{1}{8}$ inch, as shown at A. Then place the parts in the fire, being sure that it is clean and deep, and heat to a red. Then pull the pieces apart and insert borax. Push together again and add more borax. Have the helper blow all the time and keep turning the flue around and around until it is brought to a yellow heat. Then, with a light iron-handled hammer, weld the flue in the fire and smooth it up on the inside in the manner indicated in the figure. Finally take another welding heat and set it aside to anneal, and you have a good job. WM. EXLINE.

Flue Welding—In answer to Mr. A. G. Ottoson's question on welding flues, in which he asks what kind of fire and anvil he should have, I would say that any good smith's fire is all right, and a common anvil, as flues are generally welded in the fire. To prepare the tube for welding, place one end over the horn of the anvil and give it an inside scarf, holding the tube at an angle, say one inch above the anvil. Draw down to a nice thin scarf at edge all around, take the end to be welded in and dress it down with an outside scarf with rasp or file so that it is nearly the same bevel as the other. Place the two together in a clean fire, take a slow heat and turn the tube to get the weld hot all around. Tap the tube on the end with an ordinary hammer until the scarfs are well together. Then take a light mechanic's hammer and weld the scarf down while still in the fire, turning the tube to insure an even welding heat all around. Dress down with rasp or file. If properly done, this makes a nice, smooth job, and a solid one, which is as good as new. W. P. JAMESON.

Welding Flues—Referring to Mr. A. G. Ottoson's question as to welding flues, I will give him my way of doing it. I have

drel in the wall close to your fire, take the flue while hot and slip over the mandrel and hammer it down smooth both inside and out.

After you have welded the flues, stop up the end and pour water in it until the weld is surely reached, so as to make sure that the weld does not leak. Should it leak, it must be welded over again. If this method is followed, you will be able to weld flues satisfactorily. J. S. SCHAFER.

A Few Comments on Shoeing—During my brief experience of twenty-five years in the horseshoeing vocation, I have found those fully qualified to shoe and treat a horse with corns, quarter-cracks, contraction, coronary and tendon troubles, spavin, ringbones and dozens of other diseases derived from an unbalanced foot, and yet I failed to find one out of a hundred who could tell what caused the trouble and why the horse was lame. One must today get the anatomy, physiology and pathology so impressed on his mind, that when he looks at the horse and watches his gait he can tell wherein lies the cause of the trouble. Most shoers are familiar with the anatomy of the foot, but the larger portion are sadly in need of the knowledge of the leg.

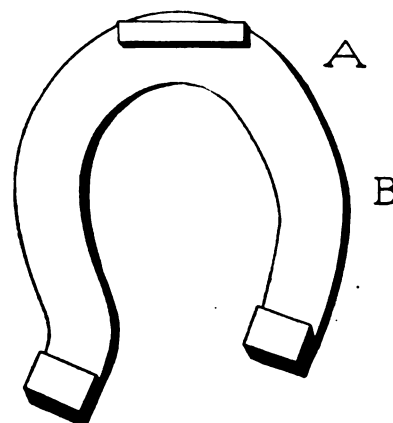
A horse's limb must always be in the position in which nature intended. One can readily see that a shoe, although ever so well fitted to the foot, and ever so cleverly nailed on, may be a trifle high on one side, or at either end, and thus cause an unnatural contraction or extension, in either case causing an interruption of the regular work of the muscle as designed by nature. Again, the paring of the hoof, either too much on the side or either end, will produce the same results. While standing or in motion, the pedal bone is suspended in the foot by the laminae which hold it to the wall of the foot, but is not supported by the bottom of the foot. Fitting on top of this is the pastern bone,

then the upper pastern bone, then the shank or cannon bone, which has on either side of it two small bones, namely, the splint bones, which are only attached by fibrous tissues, and on top of these is the knee. The instant we alter the bearing or way in which the weight is supported by the various bones and ligaments of the foot, we will have undue wear and tear, and harm ensues. Suppose we take a foot which stands higher on one side than the other. Then the whole leg is thrown out of bearing. What is the result? The instant the horse comes down on his foot, striking the highest part first, that acts as a fulcrum, or point about which it moves. The foot bears over, and we have two troubles as a consequence. In the first place, the leg tries to keep straight and it presses over to the side of the lower heel, and we have a pressure of the bone into the foot, resting as it does on the pedal bone, instead of coming down squarely on the joint. There results, immediately, pressure on the pastern or navicular bone, and there may be a bruising of the bone. Or the result may be, if the weight happens to strike a joint higher, that we have a bruising of the bone at the pastern, producing ringbone, or perhaps we may have stretching of the ligaments or tearing of the nervous vascular membrane.

To go a bit higher, at the upper part of the leg we have a central shaft, the cannon bone, with two small splint bones at the side held by a fibrous tissue. On top of them is placed the knee-joint. A crooked foot throws the leg over and we have a splint thrown out, because the horse fails to come down properly. I should like to hear from brother shoers on the topics mentioned above, and would like to see a free discussion, as it helps to get down to the fundamental truths upon doubtful points. H. N. MUDGE.

A Shoe for Interfering—As about forty-nine out of every fifty horses which I have ever shod strike with the foot between the toe and the quarter, I feel safe in saying that the plan of shoeing for interfering which I use will prove satisfactory in most cases.

The shoe should be a trifle straight from A to B, and the part of the hoof that projects over the shoe between these points should be rasped away. The hoof, however, should not extend over the shoe more than a $\frac{1}{8}$ or $\frac{1}{4}$ of an inch, according



A SHOE FOR INTERFERING.

to what the thickness of the shell will permit. If too much is taken off it tends to weaken the foot. A shoe properly fitted according to this plan will cure some of the very worst cases. If the ankle is very sore, the horse will continue to strike from one to three days after

being shod. Pare the feet as level as possible, with the outside a trifle the lower. If brother smiths who have never tried this plan will give it a test I think they will be pleased, and I should like to hear from them as to the results. A. L. SPINK.

A Shoeing Experience—I live in a country town, and after following the business for about twenty years, have quite a bit of experience in shoeing, as I am a close observer and have always tried to learn. For that reason I have subscribed to THE AMERICAN BLACKSMITH. I write to give my experience of the past summer with a horse that I shod.

A pacing horse came to my shop early in the spring, very much out of balance, cross-firing and bumping his knees. When I saw him, I was afraid that I could not fix him up, as I did not have much experience in shoeing fast pacing horses. I began work on him. I took off the front shoes and found that his heels were pared too low, so I pared down the toes as far as advisable, and took a pair of punched pacing plates, very light shoes, fitted them to the foot, rolled the outside of the toe and nailed them on. I then took off the hind shoes, and put on a pair of light hind shoes, punched plates also, and let him go out. I did not see him for about four weeks, when one day the owner came driving to my shop with a pair of knee boots on the horse, together with a quarter boot on the right front foot. I did not like the idea of not having done a better job, and told the man I would go with him to the fair ground, which is some distance, and see someone there, who was training horses, and who might help us out of the difficulty. The owner said however that he thought I could get along all right, as I had satisfactorily shod a trotting horse for him which interfered badly. Well, I decided to give him another trial. I had been reading the articles by Mr. E. W. Perrin, on cross-firing, but he did not give any ideas on pacers.

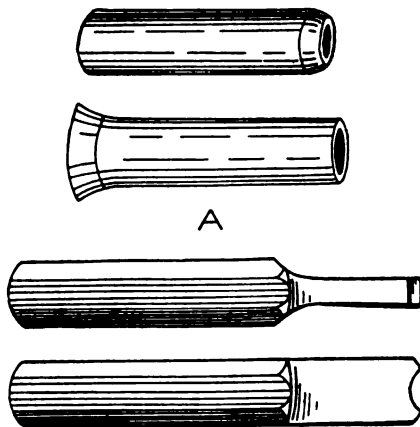
I took off the old shoes and noted how he wore them. I then pared the toes some more on the front feet and trimmed the heels well down on the hind ones. I then took another pair of those light shoes, and welded a strip to the inside of each front shoe about half an inch high at the heel, tapering and extending about $2\frac{1}{2}$ inches towards the toe. I also rolled the shoe on the outside at the third and fourth nail at the toe. This made a side weight, and also raised the inside heel; the roll allowed him to get over the toe quickly. I then went to work on the hind feet. Taking a pair of light hind shoes with steel punched plates, I calked them up a little, and put a toe on about half an inch back. The horse had a low inside heel on his hind feet, and I put what is termed trailers on both calks, something like a mule shoe, only not so long. Having turned the shoe well out at the toe in nailing it on, I thought surely this must work, and it did.

I took off his boots and threw them in the buggy, and told the owner if he needed them, he knew where to find them, and he said the other day that they were there yet.

I shod that horse this winter with ordinary snow shoes, calked and toed like all other shoes, and he is going all right on them, so that you can see that when a horse is properly balanced, there is no trouble with his gait. C. W. Y.

Welding Boiler Flues—Replying to the subscriber who asked for a way to weld boiler flues, I will outline my way, although you may get better ones.

I use pieces about twelve or fourteen inches long. Draw the tube for a scarf back about $\frac{5}{8}$ or $\frac{3}{4}$ of an inch, not making it any larger in diameter. This can be done by holding it level on the horn of the anvil. Next heat the piece and hold it up when scarfing on the horn, so as to make it a little larger. Fix all the tubes and pieces in this way, and then heat the pieces one at a time, and drive on the tubes while the latter are cold, which gives a good, clean and tight lap. Then make a hammer head out of $\frac{3}{8}$ or $\frac{1}{2}$ -inch round iron and weld a handle on it out of



FLUES SCARFED FOR WELDING. A PIPE-CUTTING TOOL.

$\frac{3}{8}$ -inch round iron, 24 or 28 inches long. Have a good deep fire, clean and well-confined and use plenty of borax at the weld as you heat. If you wish a good, smooth job, have a mandrel to drive it into the tube when you finish welding. Be sure to scarf the piece for the outside, so that the scarf will be towards you when welding.

It may be interesting to some to know that for cutting out large pipe or tubes, or for splitting boiler sheets, I use what I call a half-moon tool, making it a little thicker at the cutting edge. This is shown at B. F. L. MORGAN.

An Interesting Letter from a Veteran California Smith—Enclosed please find one dollar for your valuable paper, which I consider would be cheap at five dollars, instead of one. I don't think any young man in the blacksmith business can afford to be without it. If he is learning his trade, he can obtain more knowledge from one copy of your paper than he can in one year without it. I mean, if he will read it and follow the advice of older ones, who have had years of experience.

As for myself, I don't work at my trade any more, but I have my own shop and have a man running it for me. He has worked for me for the last ten years, commencing when he was eighteen years old. I have never docked him for one minute of lost time since he has been with me, and I don't think he has been absent from the shop ten days in the ten years. I asked him to-day when I got your letter, if he wanted the paper, THE AMERICAN BLACKSMITH, any longer, and he said, "I don't think I could get along without it." You can see for yourself what he thinks of it. As for myself, my hammering of iron is over. I have worked at the business since twelve years of age, with the exception of one year, when I was in the Civil War. My father was a blacksmith, and put me in the shop when I was very young, having me stand on a box in order to blow and strike. Now it might interest some

brother of the craft to know what we get here for general blacksmithing. I will say right here that we do not get the prices now that we did when we first came here.

We get \$1.50 for shoeing a horse with machine shoes from No. 0 to No. 4, and \$2.00 for No. 5 and No. 6, that is, the largest shoes we have to use. We charge \$3.00 for putting on or resetting buggy tires and \$10.00 for putting on new ones. 1 by $\frac{3}{4}$ inches, and \$4.00 for putting on double wagon tires, \$1.50 for setting buggy axles, \$2.00 or \$3.00 for double wagon axles, depending upon the weight. Our price for resetting old shoes is \$1.00 but we hardly ever have to reset them, as our roads are very hard and gravelly, and four or five weeks is as long as a set of shoes will last on a livery or buggy horse. Californians as a rule are not so close as Eastern people. Back East I have had farmers bring in a string of old shoes, and tell you to pick out the best ones and put them on, all sizes and shapes and none of them fit for anything but the scrap pile, but I never had a Californian do that. I have had a few customers lately from the East bring in their old string as usual. I say to them, "You haven't been out here long," to which they reply, "What makes you think so?" "Why your string of shoes is a give-away." I pity any brother blacksmith who has a set of customers such as these. I worked in the East, or rather carried on a shop for seventeen years and found that they want you to wait a year for your pay, and if you ask them for it, and they haven't sold their last month's cheese or butter, they get angry and leave you. Here in California your bills are due and collected on the first day of each month, and I can tell you I like it much better. Now some brother blacksmith might like to have me say something about horseshoeing, for that is what I have made a specialty of.

For interfering behind, when making the shoe the highest on the inside does not stop them, reverse it and make them the highest on the outside and make the inside as straight as possible. File smooth, fitting close, and you will be surprised, as I was. N. W. OUTWATERS.

Has Your Subscription Expired?

If so, you will find a bill for next year in this copy, marked "Your subscription has expired."

If it has expired, we hope you have found the paper so valuable to you in your work that you will remain with us another year, and for many years to come. Thousands of subscribers have written that a year's subscription to THE AMERICAN BLACKSMITH is worth a great deal more than a dollar to them, or to anyone interested in blacksmithing, carriage-building or horseshoeing. Many say one issue alone is worth that much. This, however, is a matter for you to decide.

It is our purpose and endeavor to put out a paper worthy of the craft, and we would appreciate the aid and encouragement of a prompt renewal subscription from you. At the same time, also, tell us how we can make the paper more valuable to you.

We do not wish to take your name from our lists at the present time, and hence hope you will send us the money at once. No renewal subscriptions will be taken for less than one dollar per year.

Remit by money order, express order, registered letter or stamps. Do not send checks, as we cannot collect face value on them. Let us hear from you.

Address THE AMERICAN BLACKSMITH COMPANY, P. O. D. 974, Buffalo, N. Y.

Special Offer for March

TO INDUCE Blacksmiths, Horseshoers and Wheelwrights, who do not know THE AMERICAN BLACKSMITH, to become acquainted with the paper and read it regularly, we make the following special offer:

For \$1.00 we will send—

- The American Blacksmith for one year,
- A Copy of "The Village Smithy," and
- A Premium—A Hoof Knife or a Pocket Level.

DO NOT MISS "The Village Smithy"

IT IS a beautiful and faithful reproduction in twelve colors of a valuable picture painted expressly for us by Raphael Beck. It will be sent to all subscribers with our fine April number. A handsome picture for framing. If not a paid subscriber, take advantage of the above liberal offer while it lasts. Send \$1.00 now so you won't miss "The Village Smithy."

And You Get Your Choice of Two Premiums—

- A strong, serviceable Farrier's Hoof Knife, Crucible Steel and Bone Handle.
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- A Handy and Dandy 3½-Inch Pocket Bench Level, Neat and Useful.

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When sending subscriptions, state premium desired. Send money by Registered Letter, Express Order, Stamps, or Money Order, but not checks.

American Blacksmith Company

P. O. Drawer 974 Buffalo, N. Y.
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Trade Literature and Notes.

ANYONE INTERESTED in Gas Engines or thinking of installing power in his shop, would be more than repaid by sending for the catalogue just issued by the Weber Gas and Gasoline Engine Co., P. O. Box V1114, Kansas City, Mo. Its 72 pages are full of excellent illustrations, interesting facts and convincing testimonials. The advantages of gas engine power are well set forth. A handsome and complete catalogue. Sent on receipt of postal.

The above company are building four distinct types of engines, and a large range of sizes.

A very attractive catalogue is the "Red Book" (already widely advertised) of the Fort Wayne Iron Store Company, 1117 Calhoun St., Fort Wayne, Ind. Its 267 pages, with price lists and illustrations, detail the Company's stock of iron, steel, wagon and carriage hardware, wood stock and carriage trimmings, for the year 1903. On page XII this firm makes a special offer.

The Lawrence-Williams Co., Cleveland, Ohio, send us their neat little folder and testimonial cards, relating to Gombault's Caustic Balsam for both horse and human ailments.

Goodell-Pratt Co., Greenfield, Mass., have sent us their handsome catalogue, No. 6, of 128 pages, with descriptions and engravings of their large range of tools. An unusually interesting book of its kind. Free on request.

A new catalogue of Cray Brothers, Cleveland, Ohio, will be ready about March 15th, showing a complete line of tools and all kinds of supplies for blacksmiths. We are informed that the catalogue will be sent free of charge upon request, and that the information contained therein will make it well worth sending for. See page XII.

The Selle Gear Company, Akron, Ohio, send us their latest complete catalogue, a neat booklet of 120 pages, illustrating, listing and describing their spring wagon gears and wagon specialties. The catalogue gives a great many specifications for gears, particularly platform gears of

different carrying capacity, ranging from 1-inch axles to the heaviest merchandise trucks, and will be found a very valuable guide to the wagon maker in this class of work.

A very valuable booklet has been issued by the Nicholson File Company of Providence, R. I. "File Philosophy" it is called, and it certainly contains some very solid "philosophy" concerning files of every class and description—how to use them how to clean them and the names of different kinds with illustrations of each. This booklet is to be had of the above company for the asking.

Bryden Horse Shoe Company, Cata-sauqua, Pa., manufacturers of shoes, plates, ribbed steel, etc., have just forwarded their revised trade price list, taking effect February 1st.

We have been informed that the Bauer Carriage Goods Company, at 987-941 West Eighth Street, Cincinnati, Ohio, manufacturers of buggy tops, cushions and backs and all kinds of carriage trimmings, has recently changed their firm style and will in the future do business under the name of Bauer Brothers Manufacturing Company.

The Chicago Flexible Shaft Company, Chicago, Ill., sends a handsome and elaborate 64-page catalogue, illustrating and describing completely their line of Stewart Gas Furnaces, adapted for illuminating gas, natural gas or gasoline, and outlining their convenience and advantages. The same catalogue shows the Flexible Shaft made by this company and its various applications.

The new Sweet Tire and Rubber Company, of Batavia, N. Y., has been recently organized and incorporated with the following officers: Frank Richardson, president; A. W. Caney, vice-president; John M. Sweet, secretary and George E. Perrin, treasurer.

Work at the company's new plant at Batavia is progressing speedily. All of the machinery has been shipped and considerable has arrived. The special foundations for the large rubber machines have been completed. The officers expected to move into their offices at the plant last month.

"R. Mushet's Special Steel"

The Original Air-Hardening Steel

and STILL UNAPPROACHABLE in general excellence.

Thirty Years' Experience in Engineering Works in all parts of the World has proved Beyond all Doubt that this Steel is in every respect

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YET MANUFACTURED

Uniformity of Quality in Every Bar. A Great Saving in Steel, Time and Wages, and Easy to Work. There are no difficulties to contend with in forging R. Mushet's Special Steel into tools and no loss in reheating. The best all-round Steel.

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If a fast-cutting steel is required, this is the best and most reliable of this grade. It will do more work than any other known steel, and every bar is uniform and free of the "Cracking" so generally a feature in steels of this grade.

The "R. Mushet's" Steels are manufactured only by **SAMUEL OSBORN & CO.**, Clyde Steel & Iron Works, Sheffield, England.

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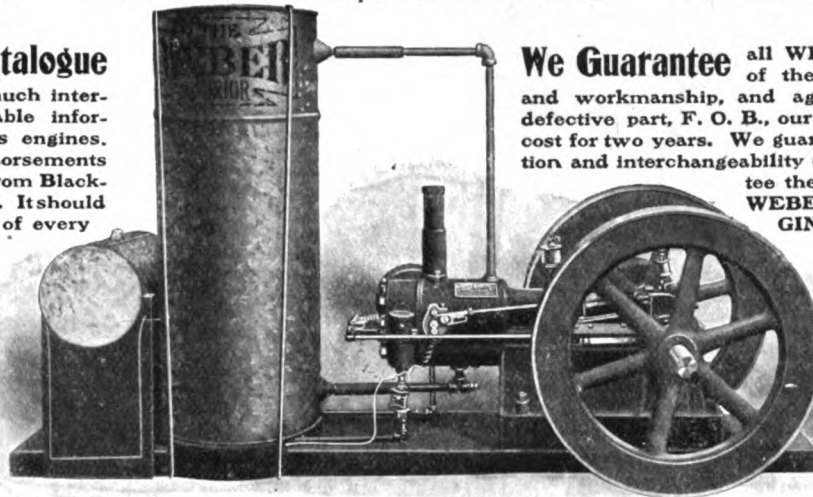
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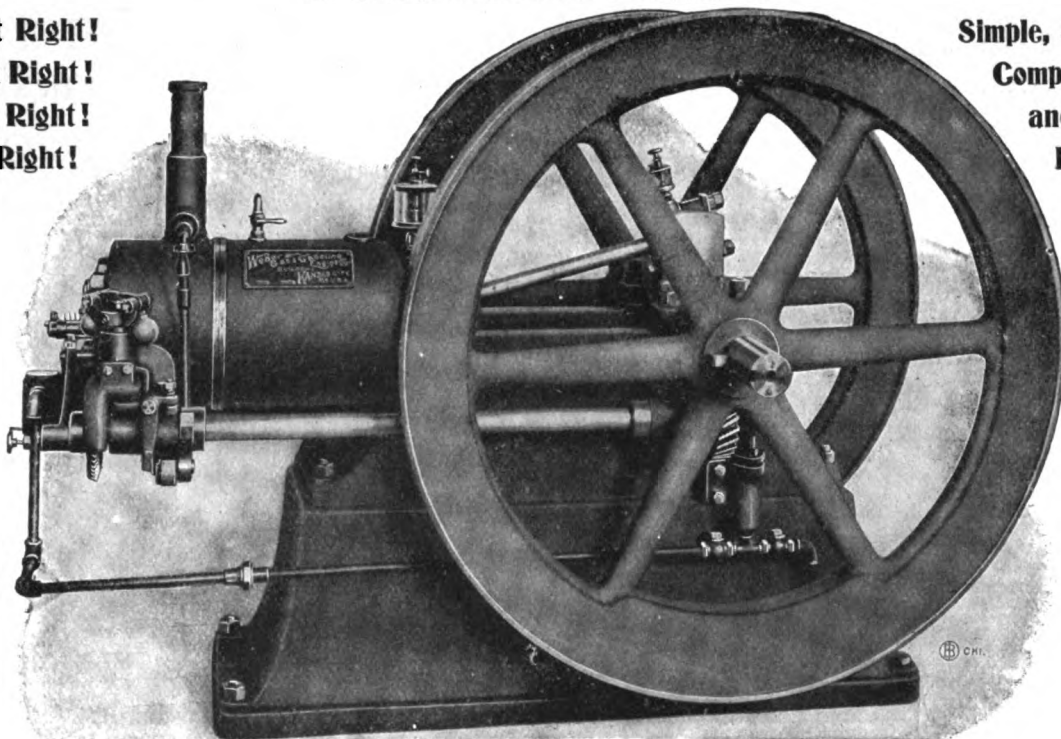
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676,322 34,882
676,323 34,883
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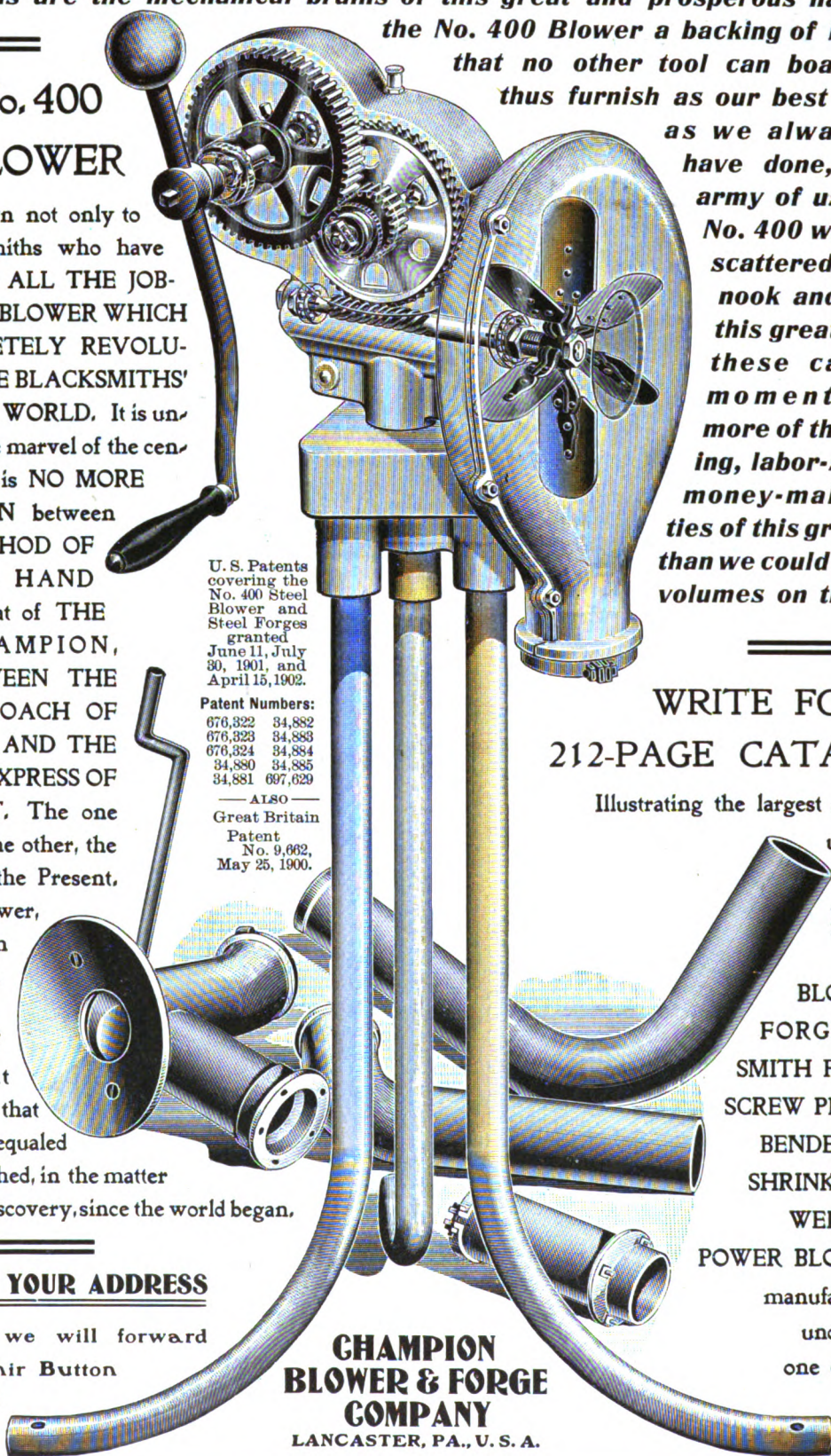
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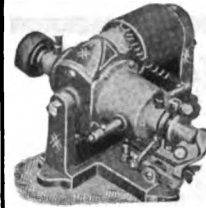
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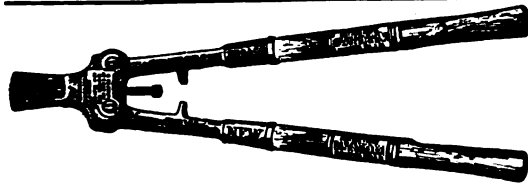
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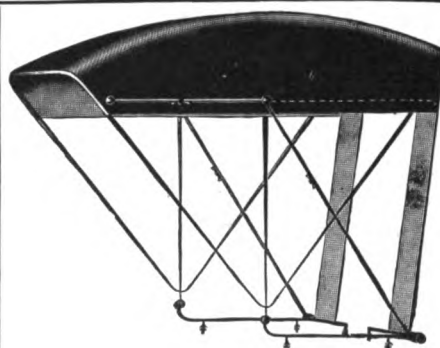
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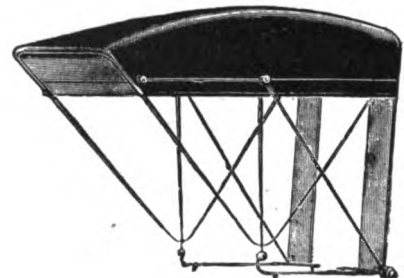
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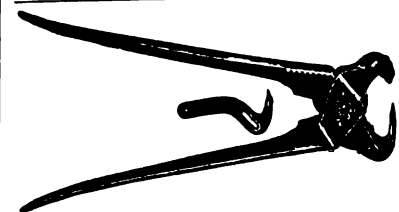
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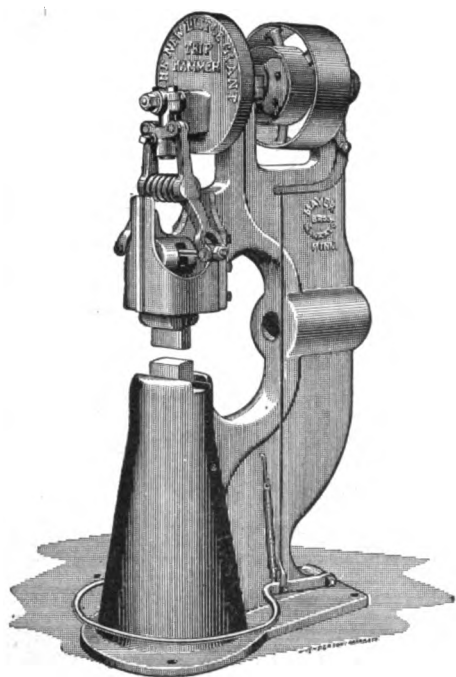
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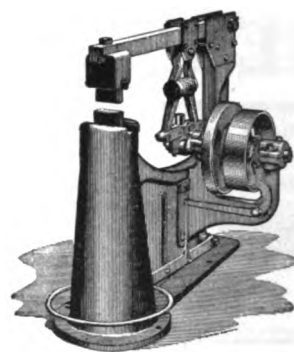
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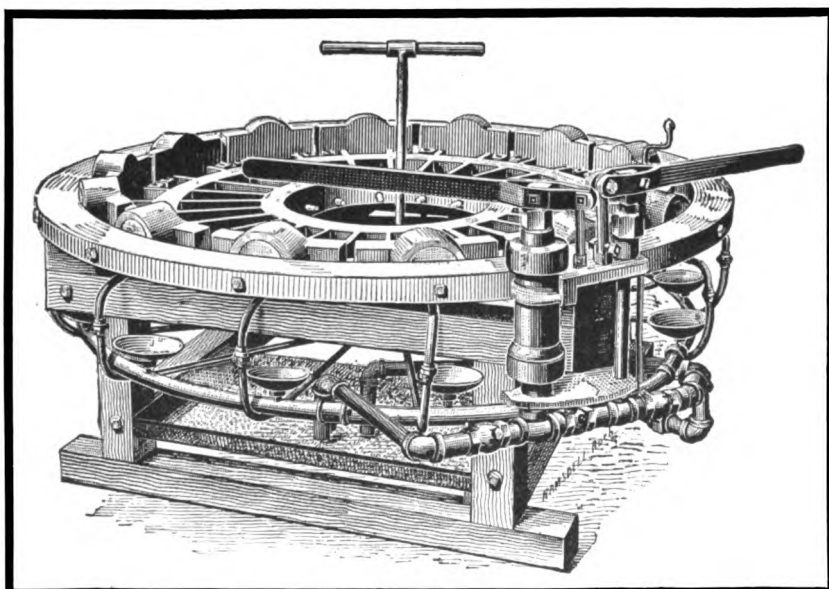
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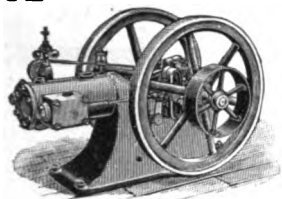
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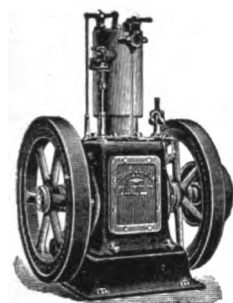
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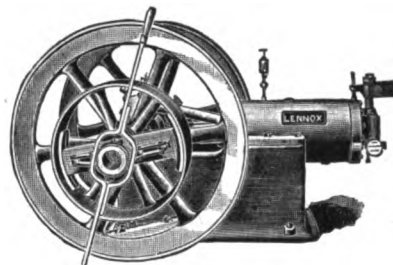
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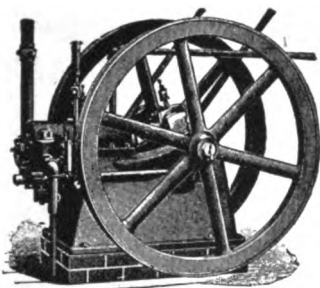
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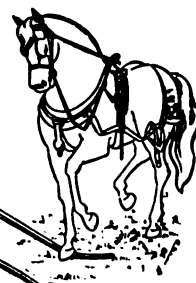
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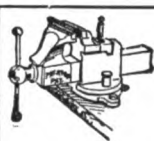
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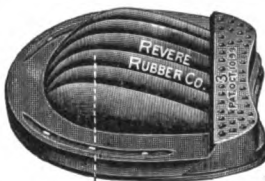
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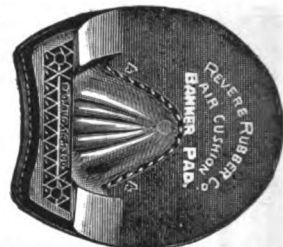
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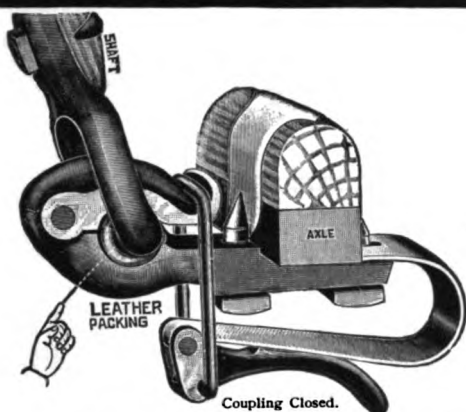
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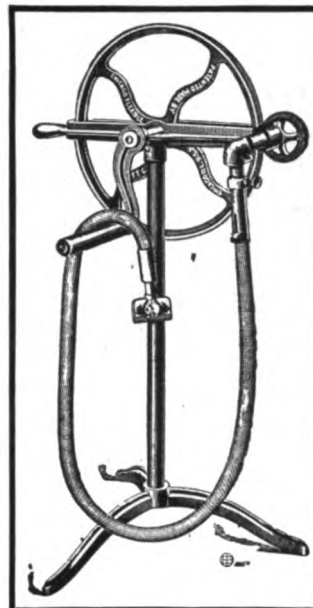
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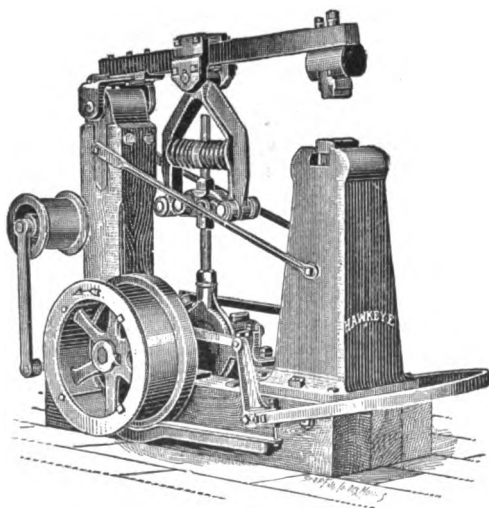
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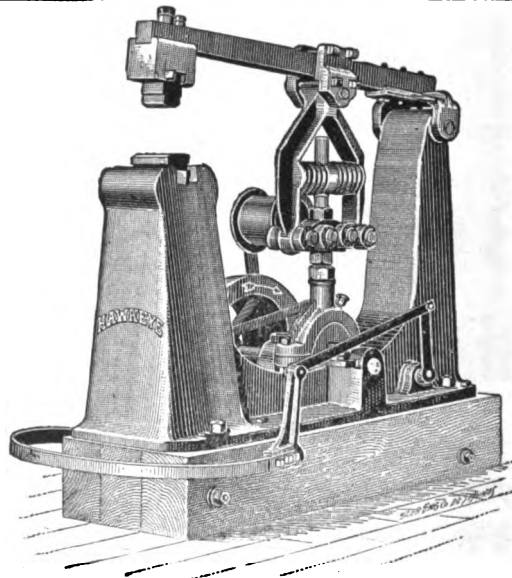


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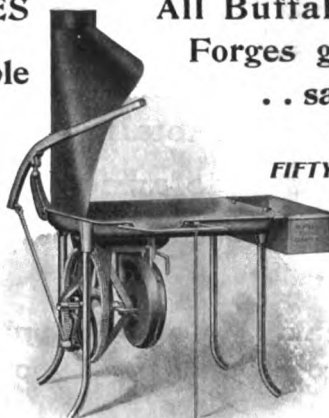
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*Complete lines of Punches, Shears,
Bar Cutters, Tire
Benders, Tire Up-
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Hand Drills*



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Just Out



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All Buffalo Tools and
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SIZES OF STATION-
ARY AND
DOWN-DRAFT
FORGES**



No. 3 Out-door Forge



No. 03 D Stationary Forge

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—BUFFALO, N. Y.—



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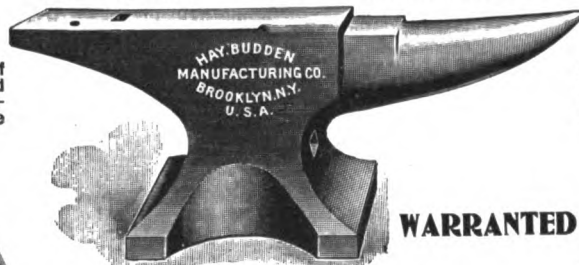
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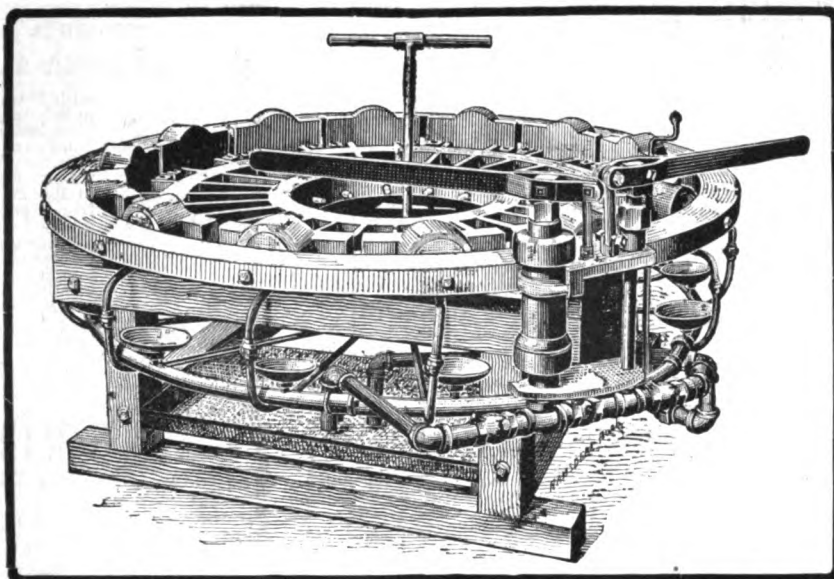
AMERICAN BLACKSMITH

BUFFALO
N.Y. U.S.A.

A PRACTICAL JOURNAL OF BLACKSMITHING
APRIL, 1903

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are the result of THIRTY YEARS' EXPERIENCE IN "SETTING 'EM COLD." THEY DO THE WORK RIGHT, they are BUILT right and they STAY right. WE CAN REFER YOU TO CUSTOMERS WHO HAVE USED OUR MACHINES FOR MORE THAN TEN YEARS, and they are doing their work today as well as when first installed. NO OTHER MAKER OF TIRE SETTING MACHINES CAN GIVE A SIMILAR REFERENCE.

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CAUTION. On March 31, 1903, The West Tire Setter Company filed a bill in the United States Circuit Court, Southern District of Iowa, against the National Machine Company, of Keokuk, for infringement of the West patents. USERS of infringing machines are warned that they are equally liable with the manufacturers.

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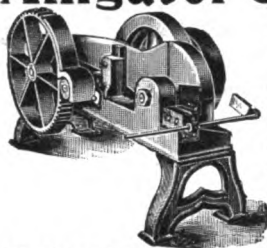
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\$ AMERICAN BLACKSMITH CO. \$

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No. 5 Combined Punch and Shear



with 12-in. throat for punching $\frac{1}{4}$ in., and a 12-in. blade for cutting No. 8 gauge metal, $2 \times \frac{3}{4}$ in. bars, $\frac{1}{4}$ in. round, weight 525 lbs. Made in 18 different sizes, from 240 to 2,200 lbs. We make a specialty of shears, punches and rolls. Tools for shearing, punching and bending sheet metal, bar iron and angle iron

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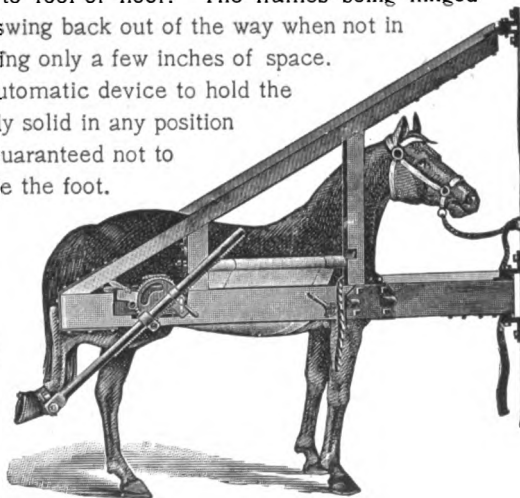
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A perfect automatic device to hold the foot perfectly solid in any position desired. Guaranteed not to skin or chafe the foot.

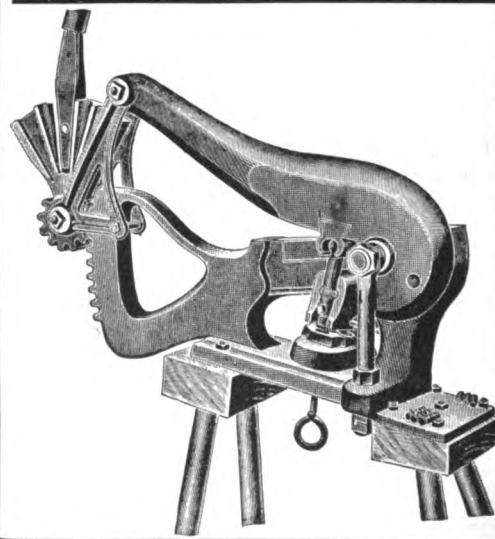
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The Sears Blacksmiths Device Guaranteed satisfactory free from every objection, with points of excellence found in no other machine on the market. Will last a life time with proper care. It only requires one man to operate this machine.

In using it the operator stands in front of the device and can with ease handle the machine with

one hand, leaving the other hand free to place the work before cutting or punching same.

DESCRIPTION.

It will shear $3 \times \frac{3}{4}$, $4 \times \frac{5}{8}$, $5 \times \frac{1}{2}$ -inch cold iron, and will also trim plow points, etc. It will cut any size bolt or bar up to $\frac{3}{4}$ inch. It will punch $\frac{1}{2}$ -inch holes in $\frac{1}{4}$ -inch iron and is provided with the following size punches, $\frac{1}{8}$, $\frac{1}{4}$, $\frac{1}{2}$, $\frac{3}{8}$, $\frac{1}{2}$, and these are furnished with each machine.

For sale by all jobbers. Send for catalogue.

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COMPANY
"LITTLE
GIANT"**

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"Little Giant" Screw-Cutting Tools and Machinery have been placed on the Pedestal of Popularity by His Majesty, the American Mechanic, there to remain till time and the ingenuity of man shall produce better tools for the same uses. "Little Giant" Taps, Dies and Screw Plates are veritable little giants in the hands of a good mechanic, and their high quality and accuracy are reflected in the quality and accuracy of the work which they produce.

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NEW LITTLE GIANT SCREW PLATE
WITH
ADJUSTABLE TAP WRENCH

Wells Bros Company, Greenfield, Mass. U.S.A.

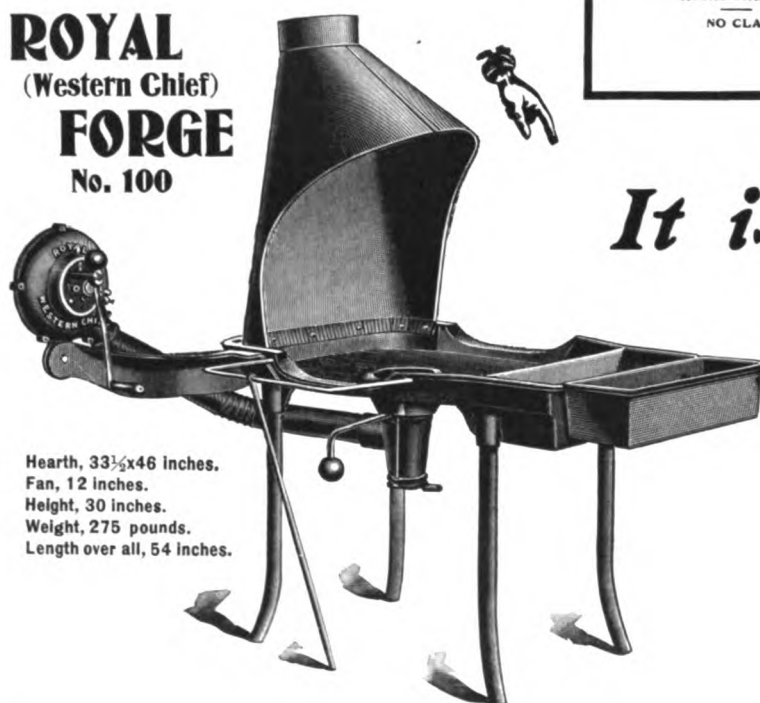
American Mechanist

ROYAL

WESTERN CHIEF

ROYAL
In Every
Sense

ROYAL
(Western Chief)
FORGE
No. 100



Hearth, 33½x46 inches.
Fan, 12 inches.
Height, 30 inches.
Weight, 275 pounds.
Length over all, 54 inches.

Reliable
Our Choice
Your Choice
America's Choice
Leads Them All



The
ROYAL FIRE POT
—
NO CLAY



HANDSOMEST: Because its constructive design is symmetrical, attractive and beautiful.

SIMPLEST: Because fan case and column stand (8 parts only) is about all there is of it.

BEST: Because made of the best material, by the best workmen and best mechanical experience that can be obtained.

SUPERIOR POINTS.

No Belts, no Clutches, no Ratchets.

The blower case oscillates on its bearing, permitting nose of case to point down or out or up, as may be desired; meeting any angle of blow pipe, thereby saving one elbow and 10 per cent. of blast force; besides valuable room occupied by other blowers.

The crank turns forward or backward, as suits the operator.

The gears are Phosphor Bronze and Steel, cut on the most scientific principle; they are flat, and straight cut (no spiral or worm gears); which combined with Steel Shafts and Composition Bearings made and assembled perfectly, run noiseless, and makes this the best blower in the world.

The Gear Case is oil tight and dust proof, permitting gears to run in a bath of oil.

The Blast is very powerful, and as positive and steady as a power blower, and takes less labor to operate than others. The after blast is strong and lasting.

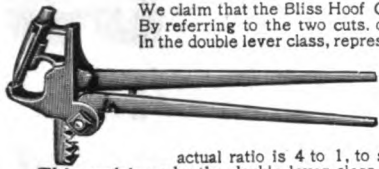
The Column Stand and Iron Base give a solid, non-trembling foundation. The room it takes is less than any other blower.

*It is the way
they are
built that
pleases so*

MADE BY
Canedy-Otto Mfg. Co.
CHICAGO HEIGHTS, ILL.

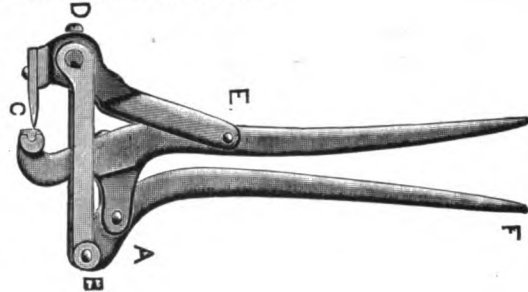
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"IT IS THE MOST POWERFUL"



We claim that the Bliss Hoof Cutter is the most powerful tool of its kind on the market. By referring to the two cuts, one can see the difference between the Bliss and any tool of the double lever class. In the double lever class, represented by the lower cut, all the power is exerted at D, to be delivered to C. The distance between C and D is usually equal to one-third of the distance between C and E. Thus one-third of the power developed is absolutely lost.

This class of cutter is usually levered at the ratio of 6 to 1, one-third being lost; the actual ratio is 4 to 1, to say nothing of loss by friction. This explains why the double lever class of cutters is not as good as the old nippers, which developed power at the ratio of 6 to 1 with no loss. The Bliss Hoof Cutter is levered at the ratio of 20 to 1, with practically no loss of power. Therefore, "It is the most powerful."



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\$4.50 to \$180.00

Akron Wagon Gears are sold in every State in the U. S., and are the best that time and skill can produce.

800 to 20,000 lbs.

AKRON GEAR COMPANY, Akron, O.

RUBBER
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TOP
BUGGY,
\$27.50



RUNABOUT, \$35.00

BUGGY
TOPS,
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Write for 100-page Catalogue. It's free. Compare Our Prices. Estab. 500-520 EAST COURT ST. CINCINNATI, OHIO.

Every Carriage Shop

HAS USE FOR ONE OF OUR
PERFECTION VARNISH CUPS
PRICE \$1.00, POSTPAID

READY FOR USE. READY FOR STRAINING.



STRAINING CUP. VARNISH CUP. WIPING CUP.

You get one for nothing with your first order amounting to \$10.00 or more.

WE issue a special price list of just the things carriage painters want and nothing else. The prices are net, cash-with-order prices; nothing added for expenses or collections. All your money goes into the goods. The best way to buy and sell. We will mail this sheet to you if you will mention this paper. You will buy from it if we do—the prices are right.

GEO. E. WATSON CO.

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Send for net price list "B" of Carriage Painters' Supplies.

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ARE made from the best selected materials, in the most workman-like manner, and every one is warranted for two years . . .

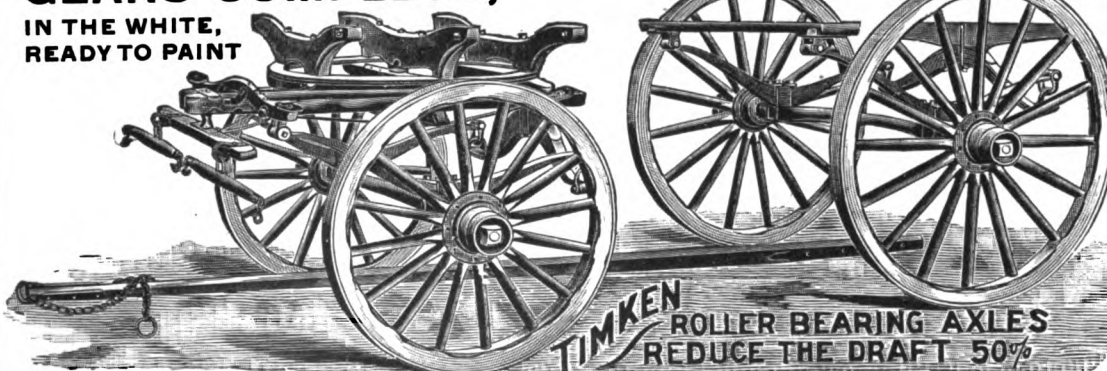
OUR proposition to dealers and repairmen is particularly attractive

NEW STYLES
NOW READY

Kalamazoo Wagon Company

KALAMAZOO, MICH.

GEARS COMPLETE,
IN THE WHITE,
READY TO PAINT



TIMKEN
ROLLER BEARING AXLES
REDUCE THE DRAFT 50%

FOR LIGHT AND HEAVY
Delivery Wagons
ALSO FOR
Ice, Brewery and
Transfer Wagons

THE SELLE
GEAR CO.,
SOUTH HIGH ST.
AKRON, OHIO.

In writing for prices give full specifications and description of what is wanted, so as to enable us to make prompt quotations.

99 BUFFALO 99

GEARED PORTABLE HAND BLOWER

NINETY-NINE

This Blower is the result of continuous experimenting, and we are able to say that our No. 99 of today is the most improved and powerful hand blower made.

WE have manufactured Blacksmith Blowers and Forges for twenty-five years, and our constant effort and study has been to increase the output of the blacksmith's shop by giving him the most improved tools to work with.

TIME is money with the blacksmith, and the point where time is saved is at the forge. The forge, to save time, must heat quickly, and to heat quickly it must have a blower with a uniform and powerful air blast.

OUR No. 99 Blower is the one we guarantee will increase the output of your shop 33 per cent.

YOUR dealer will send one on trial if desired—ask him.

IF it is not perfectly satisfactory and as represented, return at our expense.



SIMPLE!
DURABLE!
COMPACT!
EFFICIENT!

AIR BLAST STRONG
AND UNIFORM.
ACTION SMOOTH.
OPERATION EASY.
NO LOST MOTION.

Write for new
Blacksmith Tool
Catalogue.

99 BUFFALO FORGE COMPANY 99

BUFFALO, N. Y.

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SPUR GEARS ARE GEARS ON PARALLEL AXES.

SPUR GEARS

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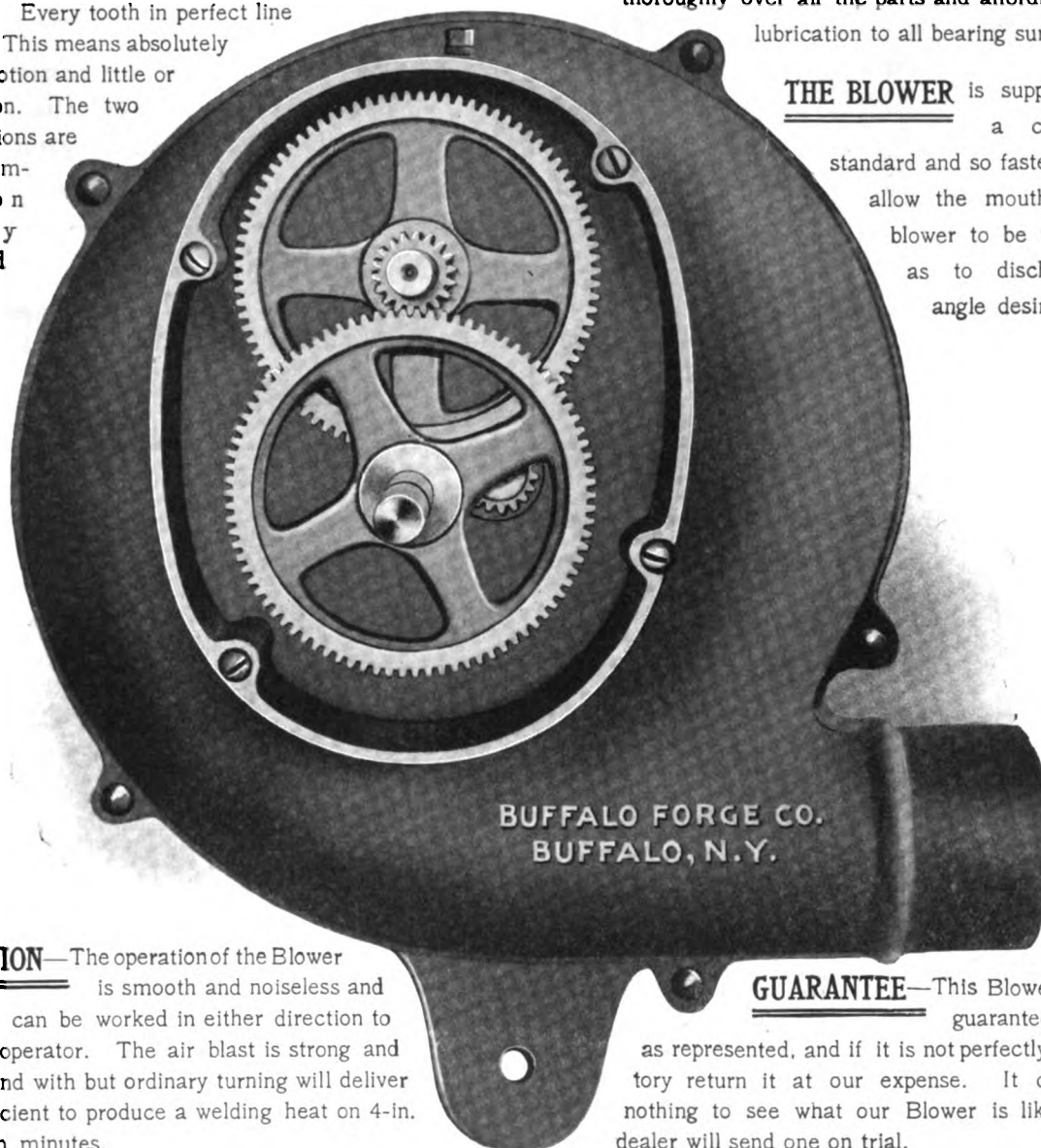
AS THEY OPERATE IN OUR No. 99 HAND BLOWER

SIMPLICITY—As shown by the illustration only four gears are used. This is a winning feature as there is no complicated machinery to get out of order.

THE GEARS—The two main gears are perfect castings, machine cut, accurate and true. Every tooth in perfect line contact. This means absolutely no lost motion and little or no friction. The two small pinions are special composition perfectly cut and adjusted.

LUBRICATION—The four gears are enclosed in a dust proof frame. The frame is made perfectly tight so that oil to the depth of one inch may be maintained at the bottom of the case. In this the lower gear wheel constantly revolves, throwing the oil thoroughly over all the parts and affording ample lubrication to all bearing surfaces.

THE BLOWER is supported on a cast iron standard and so fastened as to allow the mouth of the blower to be turned so as to discharge at angle desired.



OPERATION—The operation of the Blower is smooth and noiseless and the crank can be worked in either direction to suit the operator. The air blast is strong and uniform and with but ordinary turning will deliver blast sufficient to produce a welding heat on 4-in. iron in ten minutes.

GUARANTEE—This Blower is fully guaranteed to be as represented, and if it is not perfectly satisfactory return it at our expense. It costs you nothing to see what our Blower is like. Your dealer will send one on trial.

SEND NAME AND ADDRESS FOR LATEST CATALOGUE

99

BUFFALO FORGE COMPANY
BUFFALO, N. Y.

99

The **TURNER**
GASOLINE
Double-Jet Torch

FOR BRAZING, TEMPERING, DRAWING TEMPER, ANNEALING, BURNING OFF PAINT, SOLDERING, OR ANY OTHER WORK REQUIRING HEAT, THIS TORCH IS MORE THAN TWICE AS GOOD AS ALL OTHERS.

We call it DOUBLE JET because the burner is constructed with two separate and distinct jets, an air jet and a gas jet, which are independently controlled and operated. These two jets enter the combustion chamber separately, and are there united and shot forth into one intensely hot pointed flame of about 3500 degrees which can easily be adjusted to a broad flame of equal intensity.



**RUBBER TIRE
Retaining
Wires**

EASILY BRAZED
WITH
THIS TORCH.

The Turner Double-Jet Torch fuses nickel easily requiring 2912° while no other torch will successfully flow brass requiring only 1873° of heat.

No. 4 A Double-Jet Torch, each, \$4.50.

THE TURNER BRASS WORKS,
63 No. Franklin St., CHICAGO.

TERMS:
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Order
or
C.O.D.

MONEY TALKS

Send to us for **CASH PRICES**
on our

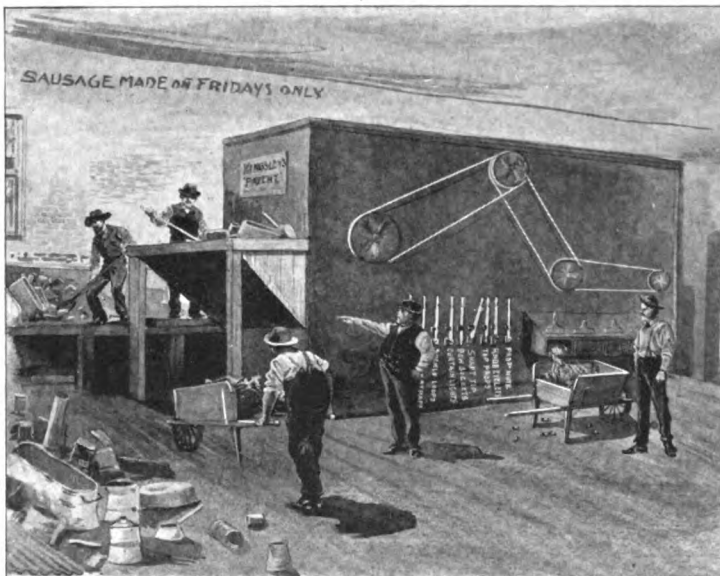
BLUE LINE VARNISHES

We give you a guarantee to
protect you. You get the best
value for the least money.

Lilly Varnish Company
INDIANAPOLIS, IND.



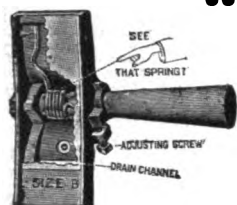
MOST OF OUR GOODS ARE MADE BY
Automatic Machinery
NO WONDER THE PRICE IS SO LOW AND
THE QUALITY SO HIGH



Crandal, Stone & Co.
BINGHAMTON, N. Y.

OUR CATALOGUE WILL TELL YOU ALL ABOUT IT





"Spring" Brake Blocks

OVER 20,000 SETS SOLD

For Carriages, Wagons and Trucks

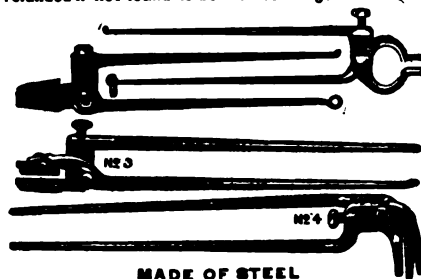
12 Sizes for Tires from $\frac{3}{8}$ in. to 5 in. wide. Wear shoes fitting these blocks adapted to either Steel or Rubber Tires.

MORGAN POTTER, Sole Manufacturer,

CATALOGUES.

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YOUR CHOICE Any Two Pairs for \$1.75. Money refunded if not found to be the best tongs in existence.



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ACME TONGS COMPANY 110 N. Kedzie Ave. CHICAGO, ILL.

When you buy a **Hand Power Tire Setter**

get the best one made

It is the **Henderson**

700 have been made and sold



The first and last practical hand power tire setter

It sets tires cold, keeps the dish just right and puts a wheel in the best possible condition. It tightens spokes in hub and rim and all joints.

Write for Circulars, Prices and Terms.

STANDARD TIRE SETTER CO.
KEOKUK, IOWA.

REASONS WHY YOU SHOULD USE

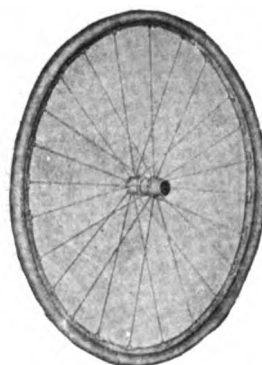
Newton Steel Wheels

They are finest in appearance. You never have to reset tires. You never have to put in new felloes. Stronger than wood wheels. You can replace a spoke in five minutes. Much cheaper than wood wheels. You get 50 per cent. more wear out of our steel tires than you do on wood.

SEND FOR NET PRICES AND FURTHER DESCRIPTION

THIS IS THE ONLY WIRE WHEEL WHICH MAY BE USED WITH ANY STYLE OF AXLE

Specialty of wheels for pony vehicles. We use **WOOD HUBS** in our wheels and they will receive any style of box, the same as wood wheels.



NEWTON STEEL WHEEL CO.
KALAMAZOO, MICH.

Brown-Ensor Mfg. Co.

Incorporated

Carriage and

Automobile

Bodies

ENTIRELY

.. NEW ..

a Specialty

A patent body without screws or plugs and guaranteed to be stronger than other bodies

Write for Particulars. Orders Filled Promptly.

Brown-Ensor Mfg. Company

BRADFORD, PA.

How the Mending of Cast-Iron is Progressing.

We are learning every day of new and greater possibilities of the business. We can now braze a big fly-wheel weighing many tons. If a piece is broken in several places, we can braze one piece at a time with **Ferrofix**.

An ordinary mechanic can braze copper, brass and steel better and quicker and cheaper than expert workmen were ever able to do it before.

Do You Want an Agency?

The business is full of profit: You make the money you make on your own shop (if you have one); you make a profit on all the **FERROFIX** you sell; you make a profit on every shop-right; you get the dividends on your stock.

Send for book and special proposition for your region. If you don't want to write, fill out the coupon attached to this advertisement and send it to-day.

American Brazing Co.

Department F

136 S. Fourth St., Phila., Pa.

UNION TRUST COMPANY,

Fiscal Agents,
Philadelphia.

**THE AMERICAN
BRAZING COMPANY**

Department F, Philadelphia, Pa.

Please send me book and tell me upon what terms you can give me the exclusive agency

for
(Name of Town, City, County or State.)

Name

Street

Town.....State.....

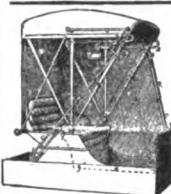
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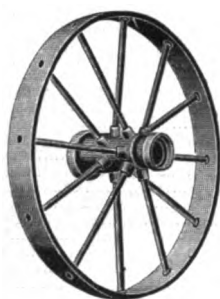
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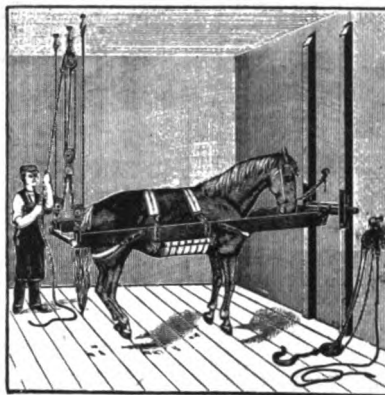
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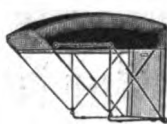
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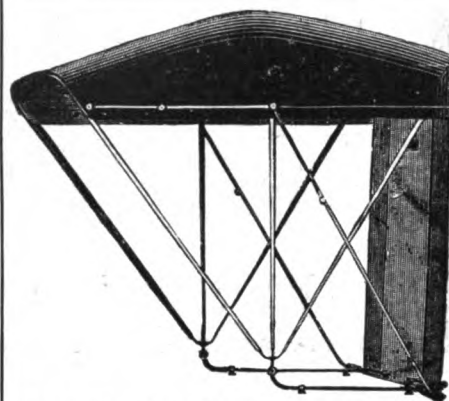
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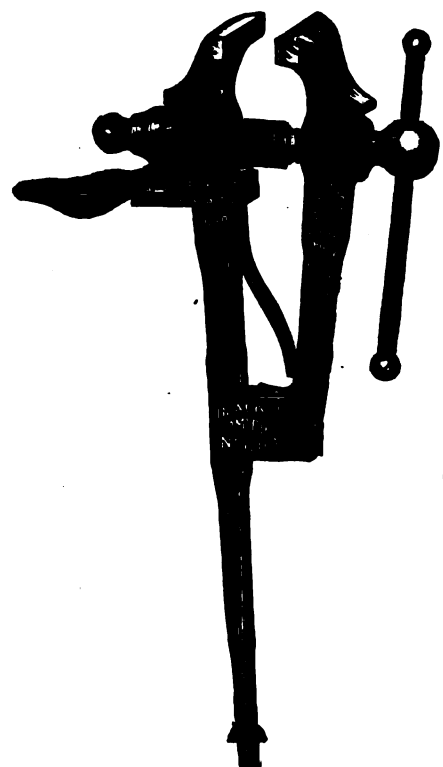
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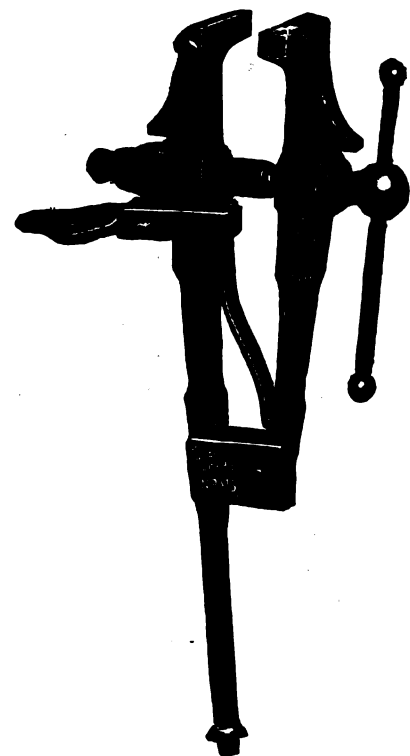


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THE AMERICAN BLACKSMITH

A PRACTICAL JOURNAL OF BLACKSMITHING.

VOLUME 2

APRIL, 1903

NUMBER 7

BUFFALO, N. Y., U. S. A.

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Incorporated under New York State Laws.

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Cable address, "BLACKSMITH," Buffalo. Lieber's Code used.

Entered February 12, 1902, as second class mail matter, post office at Buffalo, N. Y. Act of Congress of March 3, 1879.

That Subscription Prize.

It has been decided by the publishers to leave open for one month longer the contest for the subscription prize recently offered. Ten dollars will be given to the person sending the greatest number of subscribers to THE AMERICAN BLACKSMITH before May 1st. A great many small subscription clubs have been sent in, but we wish to emphasize the fact, that a small club of perhaps fifteen or twenty subscribers will probably win the prize. It is not too late for you to win. Will you put forth an effort? Even if you don't win the prize, you will be awarded a cash commission on all new names obtained in return for your effort. The contest closes May 1st.

Wanted: Up-to-date Shops.

One of the principal needs of the blacksmithing craft at the present time is to have shops that are up-to-date in every respect—in arrangement, equipment, conveniences, improved tools and finally in appearance, interior and exterior. THE AMERICAN BLACKSMITH is offering a prize of \$5.00 for the photograph of the best shop. If you consider that your establishment is a model one, or will give hints to brother craftsmen on how best to arrange shops for blacksmithing work, send us the photograph

of your shop, an outside view, and an inside one also, if possible, and give a list of the tools with which it is equipped for the work to be done.

Some Thoughts on Spring Cleaning.

It now behooves the practical blacksmith to do a bit of shop cleaning. The rubbish accumulations should all be turned out and classed under two heads—the useful and the useless. Often parts of old articles thrown aside may be used to advantage. Again, things that "might come in" are laid away, because the would-be economist muses, "a pity to waste them," though they will prove to be of no earthly use. Many people throw out everything except what they know will be of value, preventing much undue accumulation of worthless odds and ends. The smith should use his judgment, laying away the useful, and relentlessly destroying or disposing of the useless. An untidy shop is an abomination unto all comers.

Side Lines for Smith Shops.

Attention is called to a timely and interesting article on page 123 under the signature W. B. F. It deals with the question of vehicle making in the smith shop, and gives an idea of what can be done in this way as a side line. There is no doubt but that small shops can add largely to their profits by building vehicles entirely anew, or by building over old ones. It is work which can be done at odd moments, requiring but a small outlay and yielding good solid returns for the labor and material invested. It forms an excellent way to add to the income of small shops to buy or barter for old vehicles to be built over, even if the matter of building a few entirely new wagons each year is not gone into.

There should never be any spare moments in the smith shop. As a means of filling them in, the question of buying vehicles in the white from reputable dealers and painting them up to suit exacting customers, is well

worth consideration. Here is an excellent way for the enterprising smith to add to his income without interfering with his other work.

Many other side lines will occur to the wideawake shopman. If he has power in his shop, feed grinding or wood sawing outfits may be made a means of lining his pocket. In many localities wood or iron turning lathes can be installed with profit. These are but suggestions—the smith would do well to ask himself: "In my particular locality what side line can I add to fill up my odd minutes and my pocket-book at the same time?"

A Representative Journal.

The blacksmithing craft has long needed what may be termed a representative journal, a paper in which every single smith, of no matter what class, could find that which would directly and indirectly interest and benefit him as to his vocation and his position in it. Such a need THE AMERICAN BLACKSMITH has aimed to fill, yet no one realizes more than the Editors, the great room for improvement that exists in these columns. The constant effort is to make the paper better each month, to make it suited to the craft at large, to make it a representative blacksmith journal in other words. The very ablest contributors are sought for, and their services secured, and the Editors are conscientiously striving to better the paper in every respect. It must be remembered that the field is large. What interests one blacksmith may not appeal to another. You may already be familiar with a great many things that are told in these columns, but all smiths may not have had the opportunity for learning that you have. We confidently believe, however, that there is no smith who cannot find enough in a year's issue of THE AMERICAN BLACKSMITH to warrant him calling it "his" paper. A portion of a letter just received from T. J. Kean, M. D., a well known veterinarian of Philadelphia, says: "I am very much pleased with

the paper you are publishing. While I do nothing but horseshoeing in my establishment, the articles on machine and general blacksmithing are very interesting and instructive. I like to have the men working for me know something about the trade besides making and fitting a shoe."

The Village Smithy.

A fine painting delights at first sight, but instead of wearying one afterwards, it grows more into appreciation and gives greater pleasure with each succeeding inspection. There is so much in a really good picture, appealing to so many different moods, that only a little is revealed at a time. A good picture is like a good friend, appreciation increasing with acquaintance.

Raphael Beck's latest picture, "The Village Smithy," ranks high among the many paintings of this well known artist. He has caught the true spirit of the smithy, and fixed it on the canvas for the delight of those who have the sense of appreciation. "The Village Smithy" was painted by Mr. Beck expressly for THE AMERICAN BLACKSMITH. The copy, which we present free with this issue to all our subscribers with our compliments and esteem, is a faithful reproduction of the original painting. It has been made by the finest known color process, requiring the picture to be run through the presses twelve different times, printing as many different colors from carefully engraved stones. As a finishing touch, the picture was then given a roughened surface, resembling the original canvas. "The Village Smithy" makes a handsome subject for framing—the frame should cover the outer margin entirely.

We are very glad to be able to present a copy of this fine work of art to our subscribers. A few copies of "The Village Smithy" still remain on hand, and while they last, we will send one to any one ordering THE AMERICAN BLACKSMITH for a year. Also a copy of "The Village Smithy" and a sample copy of THE AMERICAN BLACKSMITH will be sent enclosed in a strong pasteboard tube, post paid to any address, on receipt of twenty-five cents.

An English Art Iron Work Establishment of Note.

In a flat, not particularly interesting tract of country, lies the English town of Thornham—just an ordinary old country village, with its flint houses and great roomy church, its quaint, quiet streets and provincial population of

about 550. The traveller, passing down the village street, may notice an iron sign suspended in front of one of the cottages, and on it, done in iron, the words "Thornham Iron Workers" with



FIG. 1. A PAIR OF COPPER DOOR PANELS.

two sons of Tubal Cain hammering upon an anvil in the midst. A most unpretentious establishment, yet the firm (Ames-Lyde, Elsum & Company) claim the title "Iron workers to the King," and from this cottage-factory is turned out a class of ornamental iron rarely surpassed at the present day.

The beginnings of this Thornham industry are quaint, and will bear telling. Twelve years ago, a lady of the village, Mrs. Ames-Lyde, assisted by the school master, Mr. Elsum, started an evening class at the village school in bent iron-work. To this class, after working hours, came the village folk, going heart and soul into the undertaking. Many such fads are started in villages, which after a period of enthusiasm die out. Not so at Thornham. The idea had fallen in the right soil at the right season, for the work grew until the ambitious workers decided that they must extend their operations to a wider scale. To do this a forge was necessary; so the community put in a forge. This opened up an endless prospect of achievement, and instead of the night classes, day work was commenced. Besides wrought iron, many

kinds of sheet metal work were successfully undertaken.

The work advanced, orders increased, and soon it became necessary to put in five forges, which kept as many smiths constantly employed, besides two bench hands, and five apprentices. As the business increased, the demand for special office room became imperative, so that a neighboring cottage was fitted up for this purpose. One portion accommodates the photographic apparatus and the library with its interesting collection of craft literature, while another part is devoted to the designing room, where the forms of the finished pieces are first worked out on paper. The staff now includes a special photographer and an artist.

The establishment is particularly fortunate in having a competent and zealous staff. Mrs. Ames-Lyde is a lady of great artistic taste, which finds expression with equal facility in the most delicate repoussé or the heavy iron work of grilles or railings. These designs are after the Spanish and Italian schools; and in order to gain new ideas, Mrs. Ames-Lyde often visits the Continent in search of models and photographs. It is an interesting fact that the head of this iron working establishment is a woman.

Some idea of the fine work done at Thornham may be gathered from the fact that, in designs of a floral nature, every petal of every flower is made separately by hand and welded on. In these days of rush and hurry and

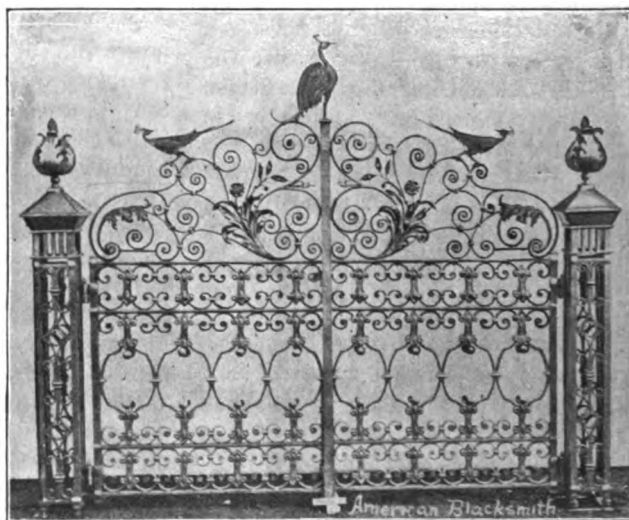


FIG. 2. A PAIR OF GATES OF UNIQUE DESIGN.

machine-made things, there are still some who can appreciate truly artistic hand work. The merit of the Thornham Ironworkers has attracted considerable attention. King Edward has placed

several orders with them, and in fact, recognition has led to their having a great many more orders than they can execute.

The accompanying engravings are taken from specimens of work done at

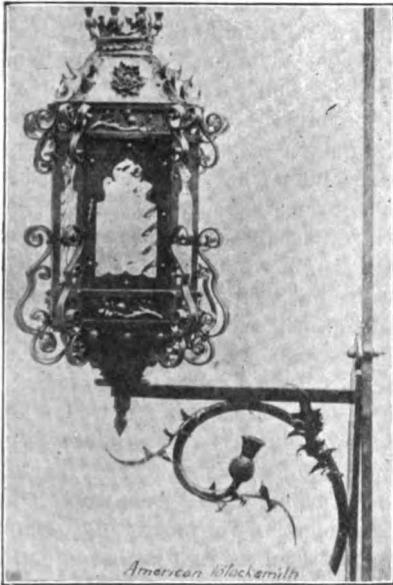


Fig. 8. AN ARTISTIC WROUGHT-IRON LAMP MADE AT THORNHAM.

Thornham. The first is from a photograph of a pair of copper door plates. Other engravings show a garden wall grille, a vase of carnations, used as a gate ornament, and a pair of gates of striking design. A photograph of one of a pair of lamps wrought for the late Queen Victoria is also reproduced.

And so they work away, quietly and steadily, fashioning by hand those beautiful specimens of metal work, the subtly artistic qualities of which the great world of machinery strives in vain to equal. It is like a glimpse of medieval times when iron work was a matter of art, and when the artist toiled slowly away for the love of his art and the beautiful things he made, thinking neither of the price they would bring, nor of the time which he spent in fashioning them.

A Paying Industry.

BY W. B. F.

Does it pay small shops to manufacture new vehicles or build over old ones? This question has been asked by a great many smiths at different times, and now I shall give my experience. In the first place, all country shops are more or less idle sometime during the year, and there is nothing that a smith can do. Then it is a good thing to have two or three old spring wagons to build over, or some new work, so that he can make use of his time. I build over two

or three spring wagons or buggies every year. I do all my own work in all its branches, iron, wood and painting. I only hire help in my busy shoeing season. I have also built two new carryalls, or busses, a ten-passenger wagon and a light passenger wagon. One I sold for \$175, and the other for \$100, and when I build over a spring wagon, I get different prices, but always good pay for my time and the new material that goes into them. I have sold them as high as \$45, and get a better wagon thrown in than was the one I sold before I built it over. So you see that you can always keep an old wagon on hand to make over, and you will always find ready sale for it, and at a good, fair price. I have been here four years next July, and I have built some dozen or more different kinds of vehicles. I find that it is the best paying work in the long run, for it is all done at odd spells.

Jottings About the City Smithy.

ROBERT MCCAVENTY.

In the shops around New York City, a man engaged as a first class blacksmith must be able to make anything from an engine rod to a cap for a mast; he must be a die maker, and a dozen and one other things. I find that the men coming from these railroad shops and presenting themselves as A 1 workmen know little or nothing of the style of New York shops. Here you have to work, and work quickly, do the job neatly, and when thrown down it must be finished. There are here many first class men in



Fig. 4. A HANDSOME ORNAMENT FOR A WROUGHT-IRON GATE.

our business and trade who can turn out first class work; but when it comes to turning it out on paper, that is, explaining the mode of operation in doing a job, why, they would collapse. We have had dozens of them employed here,

and I know from my own observation for years. In a place like ours, with such a variety of work and mixture of cranks, connecting rods, boat davits and well tools, down to spikes and worn out picks, a man has to have some curves in his arm, yes, and his back too. Not following the trade myself, but looking on at the different processes of numerous different men, I have noted the very many

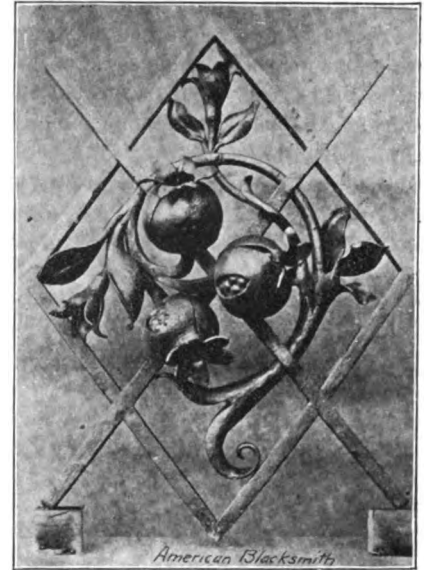


Fig. 5. A PORTION OF A GRILLE FOR A GARDEN WALL.

different ways of doing things. I like to speak about our very interesting business, and what more enchanting sight is there than that presented on a night in November, just around dusk, standing at a smithy door when a big heat is taken from the fire to the hammer, its glare lighting up the men's faces with a healthy glow, as the sparks and scale fly here, there, and everywhere. I am the son of a blacksmith, having been mixed up and connected with sledges and anvils since I wore kilts, but I don't think there is a finer sight.

Kinks and Conveniences in the Wagon Shop.—2.

BY D. W. M.

Besides wheel trucks of various sorts, and two-wheeled trestles described in our last article, there are other means of saving labor and time, and anything which will do that pays for itself many times over in a short period. To economize labor not only saves wages, but also shop room. It also saves time for customers, and by prompt service holds their trade and brings new trade.

To secure these results, make every arrangement to save carrying things by hand. In a shop arranged on several floors or spread over much ground, a

system of calls, speaking tubes, or telephones, should be put in.

For receiving goods, slides may often be used to great advantage, especially if a descent from the wagon to store room can be arranged. If the shop is two stories or more, an elevator will pay, even if run by hand. But in the absence of that, the well-known incline with a windlass at the top is necessary. There are many shops having neither, which depend on getting their goods (which means entire vehicles as well as parts) upstairs by means of ropes and pulleys (frequently outside the building), and the load is swung into a big door on whatever floor it is to be received.

Some kind of power can always be used in a shop, even a small one. If not a steam engine, then a gas or gaso-

economically done with them. Foot hammers for smith shops, foot blowers for the smith fires, foot power drills, boring machines, lathes, saws, grinders, sewing machines, etc., are quite useful for light work.

Another power, electrical, can be put in to run the elevator, the sewing machines, the smith fires, drills, etc. Where separate power cannot be afforded, and electrical power can be had, it is desirable to put it in, as one of the conveniences which may be counted a necessity, and a paying investment. There are many shop conveniences which can be put into profitable use provided there is power to operate them, which are out of the question otherwise. In favored localities water power can be utilized. Again, wind power is used in some localities, and various devices have been resorted to, to gain steadiness and continuity, one being the pumping of water into a reservoir, from which it flows through pipes to turn turbine wheels. But in any shop, no matter where situated, or how small or large, some form of power can always be afforded, as an aid.

Talks to the Jobbing Shop Painter—1.

M. C. HILLICK.

Shaft Trestle—Gear Trestle—Revolving Wheel Jack—Wheel Jack—Rubbing and Varnishing Frame—Water Barrel, Etc.

The carriage painter who struggles to meet twentieth century competition without the aid of a good equipment of labor-saving devices is, to say the least, badly handicapped. Not long since, a painter who for many years plodded along in a shop minus labor-saving devices of any sort, but who very recently has introduced many up-to-date appliances for handling work, said to the writer that by the use of these devices, he had increased the productive capacity of his little shop not less than 25 per cent.

No better time can possibly be had than now, to provide the shop with a few appliances of nominal cost, and easily made. For example, the shop needs at least a pair of shaft trestles for holding shafts during the process of painting and varnishing. Fig. 1, A, shows such a trestle, and the cut is self-explanatory. It can be made of such material, of such height and dimensions, as to best suit the individual painter. The prongs which go down through the bolster, and are fastened with a washer and nut, can be quickly made, at small cost, by our good friend, the blacksmith.

Fig. 1, B, illustrates a gear trestle, and the way it is made is clearly understood from the cut. The upright arms for catching the axle arms will afford the smith another job in the making. Make the trestle wide enough to take the axle arms of the full width vehicle. And for ease of handling, make it as light as possible, while, at the same time, giving it requisite strength.

Probably the most important labor-saving device about the paint shop is the revolving wheel-jack, of which there are many designs. None, however, are better than the cast iron bottom jack (Fig. 2, A), which for \$1.50 can be procured at your local foundry. Such a bottom will weigh about 50 pounds. Have it cast with a diameter of 18 inches. Have a round arm to insert in the bottom, and to this arm weld a stub axle providing axle stubs in sizes $\frac{3}{4}$, 1 inch, and $1\frac{1}{4}$ inches. This will take on the various sized wheels which come to the shop. The advantage, among many, of such a jack is that it can be easily moved from one part of the shop to another. Moreover, such a jack holds the wheel securely and causes it to run without wobbling, an item of importance in striping.

Probably the most inexpensive wheel jack to be had is shown in Fig. 2, B. This jack has already been published in various journals, but the illustration will bear repeating in behalf of those

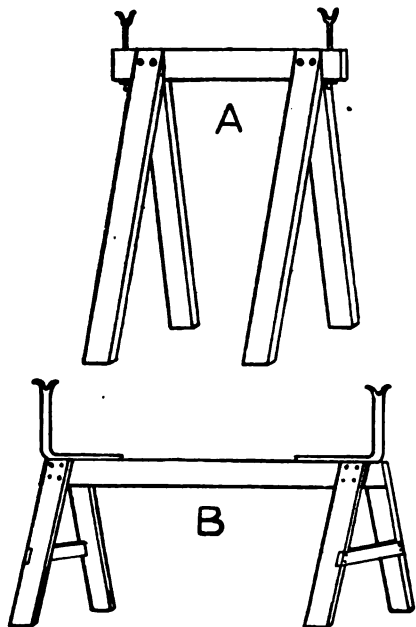


Fig. 1. TWO USEFUL TRETTLES FOR THE PAINTER.

line engine may be used to great advantage. Such a convenience and economizer of labor may cost something by way of investment, but it saves its cost very quickly and increases business. Almost any one can get credit in the purchase of such a very necessary tool in a factory, because it is a wealth producer, and the man who buys one and installs it in his shop is safer financially than he who does not.

To think of running even a small shop with hand power entirely is appalling to anyone who has ever used engine power. Yet foot power is applied to a great variety of tools for small shops, and it is not to be utterly despised. This class of tools has been so greatly improved of late years that many forms of light work can be successfully and

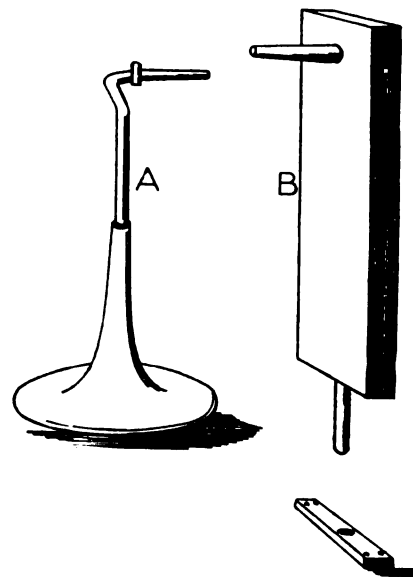


Fig. 2. A, A REVOLVING WHEEL-JACK. B, AN INEXPENSIVE FORM OF WHEEL-JACK.

who desire something that can be made right in the shop.

A 2 by 4-inch hardwood scantling, cut to a length of, say, $2\frac{1}{2}$ feet, with an iron pin set in one end and a second one made with a taper and small enough to take a wheel with a $\frac{3}{4}$ -inch box, bolted

through the side at the other extremity, constitutes the main part of the jack. Then select a likely place for wheel work, and directly over a joist, bore a hole deep enough and large

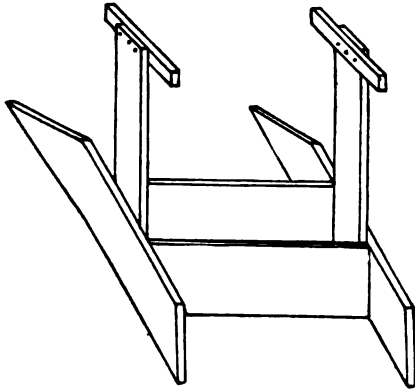


Fig. 3. RUBBING AND VARNISHING FRAME.

enough to hold the jack-pin. Screw the plate to the floor over the hole thus bored, set up the jack, and you are ready to begin work with a handy revolving jack. For striping, or for any process where it is needful to maintain a steady and true motion of the wheel, the jack shown at Fig. 2, A, is best, however. Fig. 3 illustrates a frame upon which piano, corning and similarly styled bodies are hung during the process of applying rubbing coats of varnish, and surfacing such coats. This frame, as may be seen, will hold two bodies, and as they are thus given a flat, upturned surface, heavier coats of varnish may be applied, than in case the body is set upright in its natural position. Hang two bodies on the frame. Varnish one side and one end of the first, then varnish the same part of the second. By this time the first body may be turned over and the remaining portion varnished, to be followed by the second, and so on. The body may be hung on this frame in rubbing it out of varnish. In fact, the frame is useful in every paint shop, and in almost all factory shops this design, or a similar one, is used. Make the frame of 1-inch pine stuff, length, 3 feet, height, 3 feet, width, 2½ feet. Bolt cross pieces 2 by 1 inch at top of upright, giving them a projection of about 7 inches each side of uprights. Uprights, sides, and ends should be at least 6 inches wide. Make strong and secure, as this is more essential than fine finish.

A good water barrel, or cask, with one end cut out in part, and slashed in to the chimes, as shown in Fig. 4, is a necessity in even the most unpretentious paint shop. Use this on the rubbing deck, or in the absence of this,

where the rubbing is usually done, both the rubbing of varnish and roughstuff. Keep the barrel supplied with plenty of clean, fresh water. Into this supply of water the workman may dip his sponge in rubbing and washing up his surfaces. All buggy seats, by slipping the frame into the notch cut through the end of the barrel, may be held firmly while being rubbed. If the shop is outfitted with a hose attached to water works, a fresh and abundant supply of water can thus be had in the barrel at all times. Provide a rubber boot, or cover, made to slip over the end of the barrel when not in use. This will prevent accumulation of dirt and foreign matter in the water supply.

(To be continued.)

The Blacksmith's Work as it Goes in Kansas.

A. BRUTON.

I shall endeavor to outline as best I can the way the seasons hold in this section of the country.

Plow work generally begins about February 1st, and lasts until May 15th, and consists principally of plows and listers. Then cultivators, shovels, and weed-knives are in evidence until about August 1st.

Buggy repairing is generally steady the year around; wagon repairs, such as tire setting, from July to October. Of course, this depends on the wet and dry seasons. Cutting down wagons is for the greater part done during the fall and winter. Horseshoeing is work which is with us the year around, but principally in July, August and September and in January, February and March. This winter, however, there was a rush in December. I put on more shoes in one month than I ever did in the same time before.

Machine repairing is generally done in September, or in haying time, and the repair of thrashing machinery at the same time of year as mowing machine work.

I look for a rush of plow work early this spring, as plows have already begun to come in. We have received nine already to begin work on. Of course, they are only getting ready for spring work in advance, but it looks favorable for an early spring here.

I have a great deal of well-auger work which lasts through the summer season. I have also quite a number of stone-hammers to dress, and feathers and wedges to make for a soft rock which is found in this vicinity. I have also made some for hard rock, but for

this, there is no special season of the year.

Of course there are special odds and ends of work coming in all the year around that fill in the spaces between times. The above is our routine.

The Hack Saw and its Use.

BY JOHN.

The hack saw to many is a new, and to all a most economical tool, if rightly handled and used. One reason so many of them break, is because of the altogether too small and straight handle, usually on the frame when bought. This cramps the hand, causes it to lose its grip, and a misstroke is made that breaks the saw. If the brethren will knock off that ill-shaped handle, heat and bend down the shank fifteen or more degrees, then fashion a handle one half longer and one and one quarter inches in diameter, or to fit the hand, less saws will be broken. I use a shank firmer chisel handle, but any chisel handle that fits the hand will do. Run the saw about one stroke per second; this allows the points of the teeth to cool off from the previous stroke, and the saw cuts better and longer. Don't jam the saw into the work; nothing is gained by it, and many saws are broken in this manner. It must be expected that a blade so thin and hard, doing the work it does, will be occasionally broken, but usually the hard saw has done more work, before it was broken,

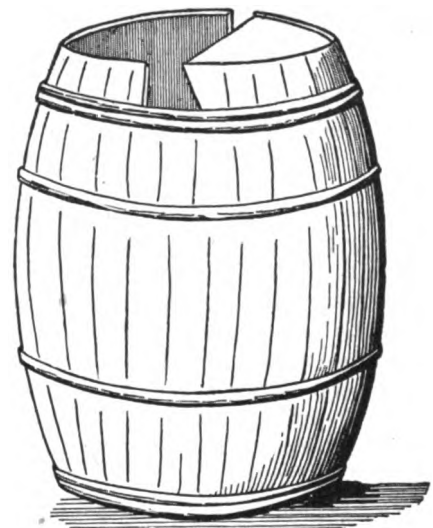


Fig. 4. A CONVENIENT WATER-BARREL, FOR THE PAINT-SHOP.

than the soft saw was capable of doing at all. All old rust and scale should be removed before sawing. A nine-inch saw is best; those which are longer spring and break easier. After a long experience I use Goodell saws, made by the Goodell-Pratt Company,

Greenfield, Mass. Had I known of the above things when I first began to use hacksaws, it would have saved me much annoyance, and not a few pennies.

Three Good Practical Recipes for Liquid Glue.

Take one quart of soft water and two pounds of the best pale glue, dissolve in a covered vessel by the heat of a water bath, cool, and add gradually, seven ounces of nitric acid (sp. gr. 1.335); when cold put it into bottles. It is very strong and does not gelatinize.

A liquid glue possessing great resisting power, recommended for wood and iron, is prepared as follows: clear gelatine, 100 parts; cabinet makers' glue, 100 parts; alcohol, 25 parts; alum, 2 parts. The whole is mixed with 200 parts of 20% acetic acid and heated on a water bath for six hours.

An improved liquid glue is made by dissolving 3 parts of glue, broken into small pieces, in 12 to 15 parts of saccharate of lime. On warming, the glue dissolves rapidly and remains liquid when cold without losing its strength.

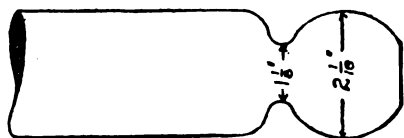


Fig. 1. FIRST OPERATION IN FORMING TOOL TO MAKE WRENCHES.

Any consistency desired may be obtained by varying the quantity of saccharate of lime.

Wrenches and Tongs with Swages for Shaping Them.

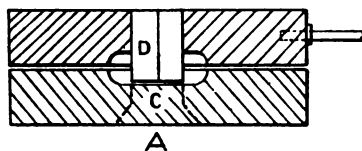
S. H. HOOVER.

I should like to recommend to my fellow-readers of THE AMERICAN BLACKSMITH the following tools for making wrenches:

First have a ball turned, as is shown in Fig. 1, a little flattened on the outer end. The dimensions on the figure show the size of ball for a standard $\frac{3}{4}$ -inch wrench. I next make a blank swage, and sink this bar into it, just as when making a plain swage. Then I take care that the swage is well chipped out, so as to free the stock and prevent it from sticking. After having the swage made, in order to form the ball, use stock of about the size required to fill out the ball well. I use water to keep out the scale, squirting it in with a syringe arrangement. When the ball is formed, flatten it out to the required size, or for a $\frac{3}{4}$ -inch wrench, $2\frac{1}{8}$ inches

in diameter and $\frac{3}{8}$ inch thick. The handle part can be forged out later.

The ball after being flattened out, must be formed in the shape that it is desired for the wrench. In Fig. 2, I show the dies which are used for shaping and punching the wrench at this



A

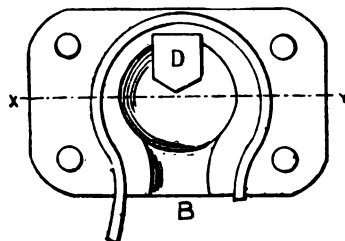


Fig. 2. DIES FOR SHAPING AND PUNCHING WRENCHES.

stage. The ball, after flattening and forming, is used to make the impression in the blocks of these dies. I always work up the edges sharply in the following way: I take a piece of $\frac{3}{8}$ -inch round iron, bending it into the shape shown in Fig. 2, B, and bed it in the dies about $\frac{3}{8}$ of an inch away from the flattened impression of the ball. I then clamp it down and work the edges up good and high. Then heating it up again, I give a few more light blows of the hammer. I then have the die drilled and slotted out to suit the style of wrench with everything in place. Fig. 2, A, is a section on the line X Y of Fig. 2, B. At C, in Fig. 2, is shown the hole to allow the plug of the wrench to drop out free after punching. I use four dowel pins in the dies to guide them accurately together. The punch, Fig. 2, D, is made of tool steel and can have the end shaped at an angle, or round, as desired. The dies themselves are made of good Bessemer steel with case-hardened faces. I think any smith will be able to understand the foregoing brief description.

I can make machine wrenches or spud wrenches at seven cents apiece, using one helper, one smith, one heater and one hammer boy. This means that you must get out wrenches in very short order.

I also have a swage for the flat handles of wrenches, which is very simple. I first forge the handle nearly about the size wished, and then use the swage. The front and back of this swage must be chipped down so as not to cut. This swage rounds the edges and swells the

center, which can be forged down to the required thickness. If placed in this swage a second time and flattened, it will come out very nicely. I can make either a single-ended or double-ended wrench in one heat, simply requiring to be straightened out a little.

I can also make a great many tongs in swages, as I shall endeavor to explain. I first shape a double ball, Fig. 3, A, in a swage made for that purpose, making the same of convenient size. For the lip of the tongs, I flatten out and shear off the end of the larger and outer ball shown at B. The inner ball is flattened the other way to form the place for the rivet hole, as at C. I then use a former to set the tongs to the desired shape, and they can be quickly finished up with a hand-hammer ready for welding on the handles. At D is shown a shape for the lips of the tongs, which I find the most convenient I ever used, as they will hold round, square, flat and octagonal iron.

Steel for Locomotive Forgings.

Extract from paper read before the Northwest Railway Club, by H. F. J. Porter.

In the early history of the locomotive there was no material available for its forged parts except wrought iron, and this material was sufficiently strong for the small duty that it had to perform. Subsequently, as the introduction of the Bessemer process developed the steam railway, and the demands for stronger metal became urgent, the substitution of steel for wrought iron in the forged parts of locomotives began.

Little was known at this time about this new material, and early attempts on the part of railway men to use steel forgings were very disastrous. The un-

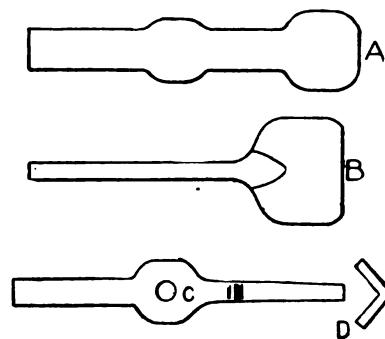


Fig. 3. A CONVENIENT METHOD OF MAKING A PAIR OF TONGS.

expected great mortality of forgings made of steel which was giving excellent results in other directions called for explanations. Chemistry, already assuming a prominent position in the Bessemer process, came forward to claim for itself a cure-all for the ills which

were fast assuming a serious nature in the steel forging industry. It was given out that steel with a high percentage of carbon was brittle in certain service; that mild steel of definitely prescribed composition would be the ideal metal. Thus the tendency was encouraged to use a soft steel approaching wrought iron in the ease with which it could be handled in the shop, especially in machining. Still, it was found, in practice, that a harder steel, when great precautions were taken with its manufacture, possessed a remarkable quality of elastic strength combined with ductility or toughness. Tests were made to establish some relation between composition and resistance to stress. A testing machine was devised which would subject the bar, to be tested, to stresses similar to those which occur in actual practice in such forgings as axles, crank and cross-head pins, piston and connecting rods, where the fibres of the metal are strained successively in tension and compression.

	Elastic Limit Lbs.	Breaks Under Rev.
Wrought iron, . . .	20,000	60,000
.15% carbon steel, . .	25,000	125,000
.25% carbon steel, . .	30,000	250,000
.35% carbon steel, . .	35,000	500,000
.45% carbon steel, . .	40,000	1,000,000
.55% carbon steel, . .	45,000	2,000,000
.65% carbon steel, . .	50,000	4,000,000
3¼% nickel steel, . .	60,000	5,000,000

Careful consideration of the results of these tests led to the recommendation of material for forgings, which should have a high elastic limit. In order to obtain this property, an increase in the carbon content, or the addition of some special element, was primarily necessary.

Owing to the appearance of the fracture in forgings broken in service, it had been supposed that they crystallized from shock or vibration. Tests of the character shown, however, soon proved that no such change in structure took place. It was further proved that materials of this kind are incapable of cold crystallization when exposed to the conditions of service mentioned.

Forgings made of the higher carbon steels continued to break in service, however, and engineers became convinced that there was something else which governed the life of steel forgings besides the chemical composition of the metal from which they were made. The metallurgist began to point to defects in the process of manufacture. Theories were put forward regarding certain features in the melting, pouring, cooling, reheating and forging

processes. It was shown that certain defects were inherent in the ingot, due to improper methods of manipulation in its manufacture. Various methods were suggested to overcome them, the most successful being the "Whitworth Process of Fluid Compression." This process consists of compressing the fluid metal in the mould under hydraulic pressure, if necessary, up to 7,000 tons. By this means ingots could be obtained which were practically homogeneous throughout and free from internal defects.

It was also found that the small hammers, then in use for welding together small pieces of wrought iron to build up large forgings, were inadequate when called upon to forge down large-sized ingots to produce steel forgings. It is evident that for such work the pressure applied should be great enough, and of such a character as to penetrate to the center and cause flowing throughout the mass. This flowing of the metal requires a certain amount of time, and the requisite pressure should be maintained throughout a corresponding period. The effect of the rapid blows of a light hammer on a large mass of metal is absorbed at the surface, and the central metal is scarcely affected. Forgings produced under hammers of insufficient capacity were found to possess cracks and cavities in their center, due to uneven working of the metal. Thus heavier hammers were introduced, and, in turn, superseded by hydraulic forging presses.

Later, when it was found that unexplained failure still continued to occur, the microscopist advanced his theories, drawn from examination of the minute internal structure of the material, that heat treatment subsequent to the manufacture of the finished product would overcome all difficulties.

If we note the rate of cooling of a steel ingot from the point of solidification of coldness, we will see that the temperature falls with regular retardation the same amount in equal divisions of time until between 1,300 and 1,200 degrees F., a point (depending on the carbon content) is reached, where the temperature suddenly stops falling, and for a time either remains stationary, or perhaps rises for a short time, and then the same rate of cooling continues as before. This point, where the change of rate takes place, is called the "recalescent" point, and from chemical and physical tests we know that a change in the structure of the steel occurs here. This point varies slightly.

The fluid steel begins to crystallize at the point of solidification, and the slower the rate of cooling from there down the larger the crystals will be when the ingot is cold. At the point of recalescence, however, it would seem as if the crystallization, so to say, locks itself, for, after the ingot has become cold, if we reheat it to a temperature below this point, on again becoming cold we will find that the crystallization is not affected, but if we reheat it a little above the recalescent point, when it is again cold the crystallization will be found to be much smaller than before.

In fact, it is known that if steel is heated slightly above the recalescent point all previous crystallization is destroyed, and a fine amorphous condition is produced at that temperature. As soon as cooling begins again crystallization sets in and continues until the ingot is cold. As, however, the time of cooling from the recalescent point is comparatively short, the resultant crystallization is correspondingly small. It can be readily understood that when heat treatment can completely change the internal condition of steel, it should bear an important part in the manufacture of forgings made of that metal.

Let us for a moment consider the changes which take place in the condition of the metal as it passes through the forging process. Beginning with the cold ingot (which we will assume has cooled slowly and is, therefore, composed of large crystals), we first reheat it up to a forging temperature of from 1,800 to 2,000 degrees F., thus passing through the recalescent point, destroying all crystallization and producing an amorphous condition. As we put it under the forging press it begins to cool, crystallization at once setting in; at the same time, however, we begin to work the metal.

The work of forging tends to check crystallization, just as disturbing water which is below freezing point will delay the formation of ice crystals. The work of forging may or may not continue (depending upon the size and shape of the finished piece) until the temperature has fallen below the recalescent point, but during this time more or less crystallization has occurred, and has been disturbed and distorted. The work of forging has, moreover, proceeded from one end of the piece to the other, the part last worked upon having crystallized considerably before work was applied to it, so that the two ends may be entirely different as far as their internal condition is concerned.

If, as is generally the case, the forging is now considered finished, it is full of pulls and strains about which we know nothing, except that they may amount to several thousand pounds to

by its contraction and elongation in test pieces. The elastic limit of an annealed forging is invariably less than one-half of the tensile strength. By "elastic limit" I do not refer to the point usually

the sudden cooling is accompanied by a "setting" of the amorphous condition, brought about by the first heating, with the result that the irregular and often coarse crystalline condition existing

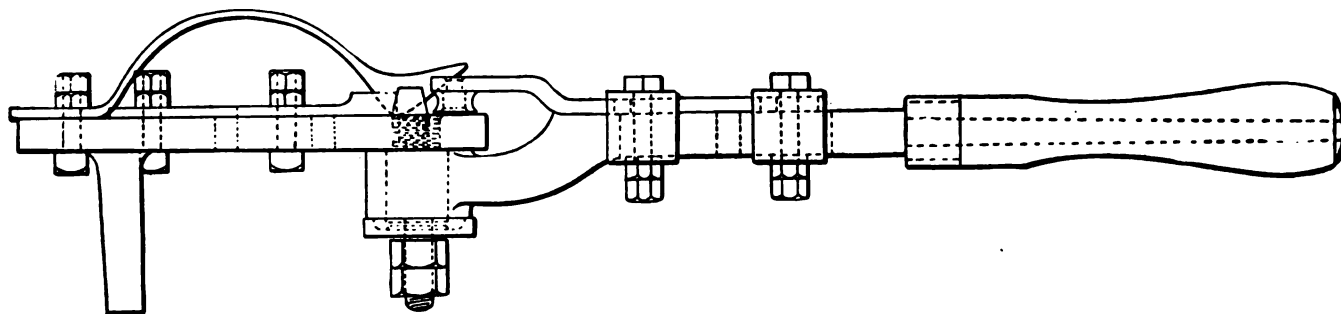


Fig. 2. SIDE ELEVATION OF TOOL FOR BENDING EYE-BOLTS.

the square inch. The extent of these strains is made evident when a forging, finished as above described, has a cut taken from it in a lathe, or has a keyway cut on one side. The strains in the fibres which are cut are relieved, and the piece invariably springs out of "true." To relieve these strains, the forging should be carefully and slowly heated to a temperature slightly above the recalcrescent point and then allowed

determined by the drop of the beam in an ordinary testing machine, but rather to the carefully defined point obtained by more accurately determined methods, which is from 2,000 to 10,000 pounds lower.

This process of annealing to relieve internal strain is a very important one. These strains are apt to develop in service, thus constituting an initial load, and may throw a forging out of

after forging is broken up and a uniform and finer grain ensues. By the subsequent annealing, strains are relieved, and the hardening effect of sudden cooling is removed to a desired degree; at the same time the elastic limit is increased proportionately to the tensile strength, and a greater toughness is imparted to the metal, as shown by a higher elongation and contraction of area in test pieces.

In order to successfully temper a piece of steel, great care must be taken both in the process of re-heating it and also in cooling it in the bath. In re-heating it, the surface metal is apt to expand away from the center and thus cause cracks in the latter, and in dropping it into the cold bath the surface metal is apt to contract onto the center to such an extent as to cause cracks in the former. In order, there-

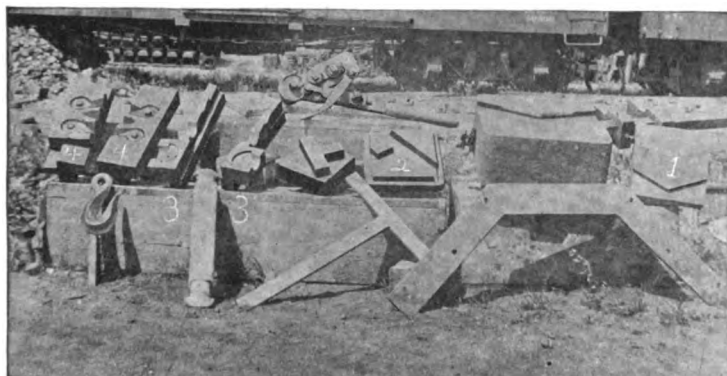


Fig. 1. THE UPPERMOST TOOL IS THE ANVIL EYE-BENDING TOOL.

to cool slowly. By this treatment, which is called "annealing," an entirely new crystallization is established, leaving the molecules of the metal completely at rest. If the forging, on being heated slightly above the recalcrescent point, is suddenly dropped into a bath of cold oil, no time is allowed during the cooling process for crystals to form, and the amorphous condition of its structure at that temperature is retained. This character of heat treatment is called "oil tempering," and is followed by further heat treatment to relieve the metal of any hardening effect due to the cooling process.

An annealed forging has its elastic limit somewhat reduced as compared with its tensile strength, but its ductility is increased very considerably, as shown

not endure indefinitely repeated alternating stresses amounting to 40,000 pounds to the square inch. A forging strain of quite small intensity may easily act in conjunction with an external stress, closely approaching the elastic limit, and bring the total working stress up to a load which, acting continuously, would soon cause failure.

The lowering of the physical properties by the process of annealing may be corrected by a subsequent treatment of "oil tempering." In this treatment the forging is first reheated to a definite temperature and then dropped suddenly into a bath of cold liquid, which may be composed of oil, or any suitable fluid. The forging must be subsequently annealed, as before, to relieve it of cooling strains. The hardening effect of

true, or even cause its complete failure, if they happen to act in the same direction as the external working stress.

We have already seen that bars of very high physical properties will

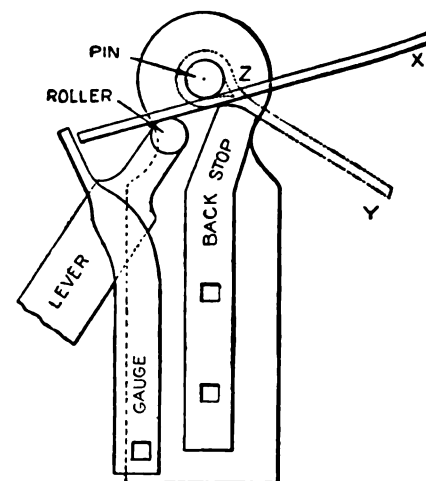


Fig. 3. METHOD OF USING EYE-BENDING TOOL.

fore, to successfully temper a forging, it should be hollow. By taking out the center it can be re-heated without danger of cracking, because the center metal is absent and the heat gets into the interior and expands both it and the

The Village Smithy.*

EDNA MANNERS.

When the early pinks of morning through
the eastern window stray,
To the shop the smith takes Toddles "just
to keep him from the way."

Soon the cheery forge is glowing and the
two work merrily;
'Midst the scrap-iron sits wee Toddles as
he shoes his horse in glee.

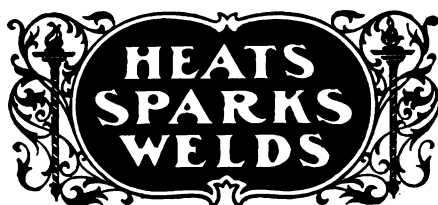
Oh, the busy hours fly quickly while the
neighbors come and go,
And they keep the smithy ringing, tossing
gossip to and fro,
But the smith drives home the shoe-nails
—steady hand and steady head—
He works on, nor stops to gossip; wife and
Toddles must be fed.

And old Jake he keeps a-thumbing down
the 'baccy in his clay.
He's the oldest and the idlest of the village
folk today.
Down upon the dead brick forge he leans,
and mourns its overthrow,
"Them new-fangled kinks!" he shakes his
head—old child of long ago.

Slow and thoughtful are his stories and
they'd wage from sun to sun,
For the hundredth time—the list'ners
know the end ere he's begun.
More to hear the toothless mumbling than
the tales their grandsires tell
Lounge the kindly group of loafers 'neath
the smithy's lazy spell.

Comes the sound of children's laughter,
and within the open door
Three little ones stand timidly and view
the smithy o'er.
Oh, a spot of deep enchantment is this
dim and blackened den,
And the smith, he's past all knowledge,
he's a wizard among men.
Eyes and mouths agape with wonder, the
good smith has looked and smiled—
Snatched a moment for the children, 'cause
wee Toddles is his child.

* Written expressly for the April number of
THE AMERICAN BLACKSMITH.



April, spring's youngest month.

How about side-lines for spare moments?

Say not "Would that I could;" say rather, "I will."

What do you think of "The Village Smithy" picture?

Do you drive your business, or let your business drive you?

A good general blacksmith is desired by J. H. Hays & Co. of Metcalf, Ill.

Make a start on a difficult or puzzling piece of work and the finish often suggests itself. Well begun is half done.

Do you make the most of your time—lay down one tool only to pick up another, and do nothing without a purpose?

Send a photograph of your shop, outside or inside views, or both. Remember, we are offering a prize for the best appearing, best appointed shop, as shown by photographs sent us.

Your opinion on lien laws for blacksmiths, horseshoers and wheelwrights is desired. Also tell us about prices in your locality, and what you think can be done towards improving them.

Courtesy to patrons should be one of the fundamental principles of every establishment. The man with a pleasant word and obliging manner wins trade every time. Just try it.

Strike out on new lines and think and act for yourself. Because Tubal Cain set the example of doing a piece of work in a certain way is not to say that you must follow. Set your own example.

A situation is open for a good, steady blacksmith at Vermilion, S. D. Correspond with R. B. Shields, who wishes a smith with a good working knowledge of horseshoeing. A good chance.

Below cost—Beware of the man who sells things or does work for "less than cost." In these days of "Every man for himself," there must be a good reason for such seemingly reckless generosity.

There is great need today for trained men of all kinds. In every craft and profession it is the man with superior training, skill or knowledge, who forges ahead; the man who makes the most of his opportunities, who gets to the top of the heap quickest. It's worth trying.

If you strike a knotty piece of work, tell your troubles in these columns, and a brother smith will probably be able to give you the kink that will straighten it out. We want you to use THE AMERICAN BLACKSMITH whenever you have anything to ask or tell your fellow craftsmen.

No escaping smoke is a feature of the modern forge and blower system being installed nowadays in most large shops. A power-driven blower supplies the blast to the forge, while an exhaust fan sucks the smoke away through a down-draft hood at the rear of the forge. In these shops no smoke or gases escape—the air is good, pure and wholesome.

To grow old is a mistake. To become out of date and be classed as a "back number" is radically wrong. Let a man keep his mind active and his "hand in," and he cannot be laid upon the shelf, no matter how old he may be. It is never too late to learn. It is said that Cato, the great Roman statesman, learned Greek when he was eighty years of age.

It appears, from figures recently published, that a man with a common school education and a special training for his craft, has twelve and a half times the capacity for earning money that an illiterate, untrained person has, and a high school graduate has twenty-five times the

capacity. Of course, much depends upon the man himself, his application and perseverance in every instance.

In these days one sees alluring advertisements of mining and oil stocks. Generally speaking, "our folks," American blacksmiths, are better off by investing their surplus in new tools for the shop or in added comforts for the family. These schemes first appear in the city papers of large circulation, but the field is evidently becoming overworked, and they are extending to the rural districts.

More essential than gold to the world is iron. We need to look around us but little to decide which we could more readily get along without. Curiously enough, there is a great African people, the Baralong, by whom iron is held sacred. It is said that once upon a time, the spirit of a great chief appeared and taught the tribe to "melt stones to make spears." Thus they obtained iron.

The oldest horseshoe in known existence is said to be one found at Uriconium, near Shrewsbury, England, an ancient city built by the Romans. Going back further, it is taken for granted from historical reference that the horses of Alexander the Great, used in his campaign into Assyria, about B. C. 400, were not shod. In the ruins of Pompeii and Herculaneum, the cities destroyed by the eruption of Mount Vesuvius, blacksmith shops have been found, but no trace of the horseshoe in any of them.

The skilled craftsman allows himself little worry over the prices his neighbor charges. He has little difficulty about getting his figure. When a customer says: "Why, Smith over here will do the job for so much," he replies, "Well, you can take it to Smith, if you like. I guess he needs it more than I do," and the work usually stays. At least this is what many, many letters from first-class craftsmen on the subject of prices tell us. If you have not reached the highest point of skill, read, study and work to that end—to a large extent prices or wages will then take care of themselves.

"Well, I don't know," said Tom Tardy. That's Tom's pet expression, for he is one of those kind of people whose opinions are very indefinite. We had been talking about power in the shop, and speaking about some of the great advantages of an engine. At length his brain began to work and he broke out,—"I ain't got no use for them new-fangled things; they're more bother than they're worth, all time gettin' out of order, or blowin' up and killin' people. Takes all a man's time to look after them." We asked Tom if he had ever seen one work, if he had been in a shop where they had an engine, or if he ever talked with a man who had run one. He said "No," at length, but added that his brother had a friend who knew a man that had been killed by some kind of a gas machine exploding, an acetylin' gas machine, he thought they called it. "I don't want nothing of the kind around," Tom concluded, and we left him tugging for dear life at his old, leaky, rattling bellows. That's Tom's way.

The American Association of Blacksmiths and Horseshoers.

Under the auspices of the above association, meetings of the blacksmiths, horseshoers and wheelwrights of Orleans County, New York State, were held on March 12, 13 and 21, at which the county was successfully organized and a complete schedule of shoeing and wagon work adopted. The following officers for the county were elected: President, J. M. Buddington, Albion; vice-president, J. Brook, Medina; secretary, F. F. Halloran, Albion; treasurer, F. W. Donohue, Holley.

The meetings were fully attended and were very enthusiastic. We congratulate Orleans County upon effecting such a strong, harmonious association. Almost every shop in the county is represented.

Our representatives are now at work in four other counties of the State, preparatory to organizing them, and the outlook is bright for early success in these also.

The following is an outline of the principal aims of the American Association of Blacksmiths and Horseshoers:

A Lien Law for 'Smiths.

How many bad accounts are due you? How much better off would you be if you could collect every dollar that was owing to you for work? Think how much more you could do for your family. What would be your saving in time and worry, if you were positively sure of your money from every job, and your customers all knew they could not evade payment in any way?

Other trades have lien laws, which allow the craftsman to put a lien on the article which he has worked on, and secure payment. In Minnesota the blacksmiths and horseshoers have a lien law. If they shoe a horse, for instance, and the owner doesn't pay, they can file a notice of lien at a cost not exceeding twenty-five cents and proceed to collect their pay. All the costs of such actions, even filing the notice of lien, comes out of the man who owes the bill.

What benefit would such a law be to you? Will you join hands with us and get it passed in your state? No other mechanic in the world works harder with head and hands for his money than the smith, and he earns every penny he gets. He is rightfully entitled to legislation to protect him from "dead beats," and to enable him to get the money which is due him. It is well to refuse work for which no pay will probably be given, but is far better to do

all the work that offers and feel there will be no question about the money. This is what a lien law will do. The smith has to pay promptly for the stock he gets from dealers to use in his work, or shut up his shop. On some of this work he is forced to wait and wait for his pay, a year or more in the case of many slow people. The lien law makes it possible for the craftsman to collect the money when it is due, and the mere existence of such a law and the power it gives to the smith has the effect of making payments come in promptly.

There is no doubt of the many advantages of such a law. The thing is to get it passed. We need your help—you need ours, too. There is usually no great objection to such legislation, as few oppose it when the bill goes to the legislature. A Horseshoer's Lien Law bill has just been passed in the Indiana Legislature. It is simply a matter of getting such a bill introduced by the legislature and influencing the legislators to vote in favor of it.

This movement is being started and pushed by the American Association of Blacksmiths and Horseshoers, which has just been incorporated under New York State laws for the purpose of securing some much needed reforms and benefits of this nature for blacksmiths, horseshoers and wheelwrights. THE AMERICAN BLACKSMITH is the official organ of the Association, and is backing the movement. But we must have the support of the smiths—yours with the rest. The effort which we will ask you personally to put forth is slight, and certainly the advantages to be gained deserve that much support from you, as you will readily admit. The combined effort of the craft will, without doubt, have the greatest weight and influence, and secure what we want. The American Association will attend to the preparation and introduction of the necessary Lien Law Bill at the State Capitol. When the bill comes up for a vote, we will notify you, and your part will be to write a strong, personal letter to each of your particular county and district representatives in the State legislature, urging the passage of the bill. Ten thousand letters from the voters of your State asking for a good law to which there is no opposition, a direct appeal from every craftsman in the State, in other words, will undoubtedly have the desired effect, and the smith will get the protection he has needed so long and deserves so strongly. Fifty letters from the smiths of your county, who are voters, written to the

particular legislators who represent your county, will have more influence than five thousand letters from men outside the district of those same representatives. In other words, you are to write to the assemblyman or State legislator who wants your vote.

Are you not in favor of this movement, and will you not support it to the extent which we ask?

A Movement for Securing Better Prices.

Are the prices which you are now getting for work high enough to afford you a good living from your daily labor? Do you think you are receiving sufficient compensation for your days of hard work? The price of stock and material has gone up greatly, as you know, and the cost of living has also been increasing. Have the prices which you have been getting for work day by day been advancing in the same proportion, or at all? Prices are not as high as they ought to be at the present time, and in many cases it is reported that the smith is unable to make a good living for himself and those dependent upon him.

This should never be at the present day when the whole country is so prosperous. No one will deny, not even the right-minded farmer, that the smith should have more money for his work to-day than he received for the same work a few years ago when general prices were lower. (All over the country wages are being advanced, and increases of salary granted to employees, either voluntarily or in response to demands). It is high time that there should be a general advance in prices on all blacksmithing, horseshoeing and wheelwrighting work.

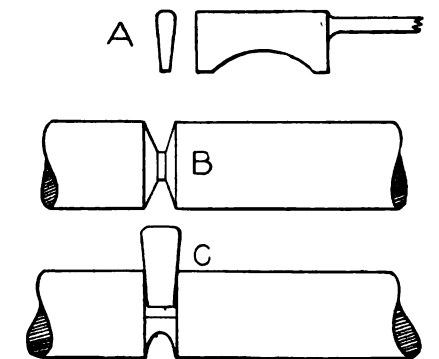
The principal reason why the prices for shoeing and blacksmithing have not gone up is because the smiths in the various sections do not co-operate with each other as they should. One man is afraid to raise his prices for fear that his neighbor will not raise, and will therefore take his trade from him. If all the smiths of a given county can be brought together to adopt prices for work, they can then be sure of getting the amount of money they rightfully earn and richly deserve.

It is the intention of the Association to place in the hands of blacksmiths, horseshoers and wheelwrights, the means and opportunity to organize and secure higher prices. The time is ripe, and the opportunity does not come every day. Will you personally take advantage of it? Everyone can see the benefits which such a movement will

bring, and co-operation is all that is needed for success.

If you are in favor of such a movement, please lend your support. Let us hear from you to-day. We have already organized several counties and have raised their prices. Our representatives are doing active personal work in many other counties. Bear in mind that this thing cannot be done in a day, but will require united, persistent effort, and if you expect to share in the benefits, you must lend your own personal support. The American Association will do all in its power to help, and will lend the services of its representatives, but the smith's own support in every case should be given, and we feel that it freely will be. Keep in touch with the work as told month by month in THE AMERICAN BLACKSMITH. Throw aside all petty jealousies for your own good, and talk it up with your neighbor smiths. Be prepared to attend a meeting in your county of all the blacksmiths, horseshoers and wheelwrights, when one is called, for the purpose of organizing and adopting higher prices.

Let us get together and lend our efforts to make a success of this. We can do it in your county, for it has already been done in others. The support which any one craftsman can give is



A GOOD METHOD OF CUTTING OFF ROUND BARS OF STEEL.

small compared with the benefits he obtains if we succeed, and succeed we can, if each one helps. The American Association of Blacksmiths and Horseshoers, being incorporated, has the power to organize the local county associations and grant charters to them. Will you join an Association in your county and stand by the prices adopted? Please refer to page X of this issue. Write to us and give us your opinions.

A Bar Cutting Kink.

S. H. HOOVER.

The following is a method which I employ for cutting off round bars of steel that my shears will not take, say

from three up to eight inches. Any one can cut off a shaft hot and secure a good, clean end, but when I wish both

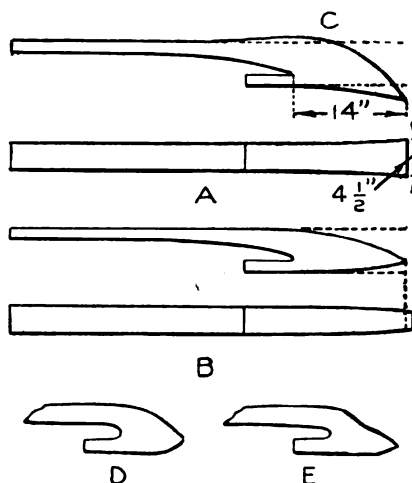


Fig. 27. CONTRAST OF PROPERLY AND IMPROPERLY SHAPED STEAM SHOVEL TEETH.

ends clean without any chipping, I proceed as follows: Lay the shaft in a swage on the hammer die. Using a hack, or cutter, A, go entirely around. This will give a cut as shown at B, having cut the shaft all around in this way, and half way off. If we continue this, we will leave a knob sticking to each end. However, we have what we may call a parting tool. This is formed the same as a hack, although it is very heavy and has a square edge, as indicated at C. The ends must nearly fill up the space left by the former tool. Drive this tool about one-half way through, turn the bar over and drive the piece out which remains, by turning the same hack upside down as the space will be greater by this process, and will allow the piece to be driven out. By this process you will make as good an end on one piece as the other.

This may be an old kink, but I have hired no less than fifty smiths in the past year, and not one of them knew how to cut off a shaft properly without spending about an hour dressing up his cut, after butchering it.

The Railroad Blacksmith Shop.—6.

W. B. REID.

Steam Shovel Repair.

The hard usage to which the steam shovel is constantly subject renders the repair of this useful and indispensable machine a matter of frequent occurrence to the railway blacksmith, and also to many outside jobbers of the same calling. The teeth of the dipper are the parts requiring most frequent renewal and repair, and may, therefore, be profitably discussed at length.

The shape and condition of steam shovel teeth when brought in for repairs, compared with their condition when newly applied, should, naturally, suggest to the smith the proper shape and proportion and mode of repairing the same. Nevertheless, they are commonly made and repaired in a very imperfect manner—poorly adapted for the most efficient service, necessitating repair at much shorter intervals than should be necessary. It will be the object of this article to describe the methods of making new and repairing old steam shovel teeth in the most economical and efficient manner possible.

Fig. 27, A, shows the proper shape and proportion of the tooth, contrasted with one of poor shape and proportion, B. The curve at the point C, should be round and full, extending slightly beyond the dotted lines; not flat, tapering and deficient at the dotted lines, as at B. They should have liberal clearance at the point; the teeth will excavate the maximum of material with the minimum of resistance, while also remaining in service for a much longer period. A comparison of the shape of old teeth as sent to the shop for repair (Fig. 27, E), with proper proportions will bring this point into clearer view.

Another bad practice, lessening the working quality of the tooth, is the cutting of the point in chisel shape fashion (Fig. 27, D). The point should always be kept full, as shown by tooth A.

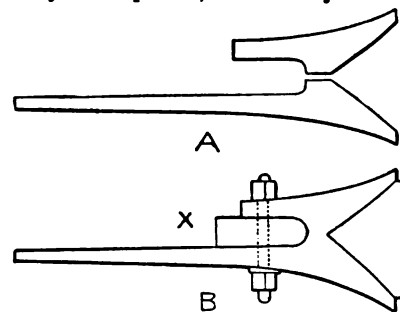


Fig. 28. METHOD OF FORGING NEW TEETH.

It will be ground away in service soon enough, and the proper curvature gives the tooth the digging or burrowing quality essential to the most efficient service.

In shops where much of this work is done, it is a good plan to have a template of proper shape and proportions for the use of the smith. This will maintain a uniform shape and size of tooth, thereby increasing the efficiency of the shovel by giving it a smoother, steadier movement.

To make a new tooth, forge two pieces, and weld in the relative position,

shown in Fig. 28, A. This will leave a full well-formed cavity for the insertion of a steel wedge, Fig. 28, B. The wedge can be held firmly in place by a

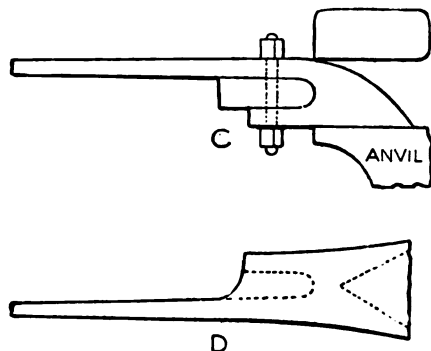


Fig. 29. METHOD OF FORGING A NEW SHOVEL TOOTH.

couple of chisel-hacks on one side, the other part being closed tightly over it while hot, as at B. Before welding, clamp a piece of flat iron of the right size in the opening at X, Fig. 28, B, to hold the parts firmly together while welding and drawing down the point. The welding of the steel properly in the point of the tooth is the most difficult and critical part of the job. Heated slowly, with borax or other welding flux, plentifully applied, the operation can be successfully completed under the steam hammer, the dies being adjusted in "safe edge" manner (Fig. 29, C). The finishing touches are to be done at the anvil with a flatter.

If preferred, this forging may also be made entirely from the solid (Fig. 29, D), and cut out at the dotted lines with a chisel. This method requires a heavier piece of iron, and is in no way superior or more expeditious than the first method described.

The proper quantity and quality of steel which should be put into the tooth is largely determined by the material at the disposal of the blacksmith. Cast steel is generally used. The greater the quantity the greater the endurance of the tooth. From ten to twenty pounds, according to the size of the tooth, may be used. When the steel is used in too small a quantity, an inferior job is the result. The iron is drawn down over the steel, as shown in Fig. 30, A, making it of little service in comparison with the large steel surface in Fig. 30, B. Considering the expensiveness of cast steel for such a purpose, and the probability of its quality being destroyed in process of welding, we believe the substitution of good soft steel to be a commendable practice. Every railroad shop has many old scrap-steel axles, driving-pins, guides, etc.,

in every way suitable for the purpose. It is comparatively easy to weld, and, treated with some hardening compound, gives a reasonable service.

(To be continued.)

Hints and Suggestions as to the Proper Use of Files.—1.*

Very few mechanical operations are more difficult than that of filing well. Unlike the tool fixed in the iron planer, whose movement is guided by unyielding ways, the file must be guided by the hand, and the accuracy with which this is done will depend largely upon the patience and perseverance given in practice, the "guiding principle," involved in many other tools and operations, being wanting in most applications of the file. While a perfect file is necessary to secure the best results in filing, knowledge as to the selection of the proper file for the work in hand, and skilfulness and practice in handling it, are equally essential.

A severe test in filing would consist in producing a true flat surface upon narrow work, or say that whose width does not exceed one-eighth the length or stroke of the file. To the uninitiated this would seem to require that the file should have a perfectly true and straight surface, but were it practicable to make the file absolutely flat and true, it would then be necessary to move it in absolutely straight lines across the work; even were this operation possible, the pressure, if applied to each end of the file, as is the usual custom, would give it sufficient spring to cause a slight

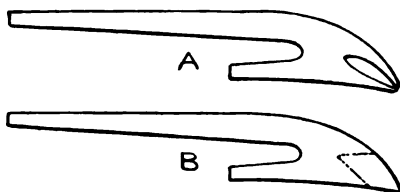


Fig. 30. POINTING THE TEETH WITH STEEL.

concavity to its cutting surface, and thus an inevitable rounding to the surface of the work must be produced.

Therefore to produce a flat surface under this severe test, or even under more favorable circumstances, the file should have a convexity given to its surface.

Convexity in Files.

Undoubtedly, few, even of the old filers, have given the subject of convexity as it bears upon broad surface filing the thought it is entitled to. It is known to many mechanics that a file which will bite and cling, with the

accustomed downward pressure, upon wrought iron or soft steel will require a greater pressure to prevent it from glazing or slipping over the work, when applied to broad cast iron surfaces. This is owing to the glassy nature and the extremely granular formation of these surfaces; consequently the teeth should enter the surface deeper than in the more fibrous metals or they will soon glaze over and become dulled or shiny, thus giving to the file the appearance of being soft, while the contrary may be the fact.

Considerable convexity is, therefore, needed in such cases; for while it gives greater control of the file from point to heel, it also presents fewer cutting points to the work with a given pressure downward than the less convex file—the bite being increased in proportion to the increase of the convexity. The ability, therefore, to increase it more or less, at the will of the operator, is of considerable importance.

In finishing many kinds of work, the absence of a suitable convexity limits the usefulness of the file—as in the preparation of the valves of steam engines, tables of printing presses, stereotype plates, or other work requiring a true surface.

While an absolutely true surface is confessedly unattainable, it is evident that, as in the above cases, a degree of perfection is sometimes desirable beyond what the necessities of other work may require; and to be able to touch the exact spot indicated by the straight edge or surface plate with the file, is to utilize it in a manner which could not be done if the convexity did not exist.

Files Properly Handled.

Before using the file, it should first of all be properly handled; not, as is too often the case, by driving the handle half way down upon the tang and thereby doubling the chances of breaking it, but by forcing it well up to the shoulder. Some of the file handles found on the market will not stand this amount of driving without splitting; in such cases the tang of an old or worn out file of similar dimensions should be heated, taking care, of course, not to draw the temper, and the hole in the handle burned out to nearly the desired size and shape, before driving it upon the tang. It not infrequently happens that the tang hole is not drilled central or is badly out of line; this may also be corrected by using a heated tang.

Of the many file handles of special construction hitherto devised, there are

* From "File Philosophy," by courtesy of the Nicholson File Company, Providence, R. I.

none which have, as yet, combined that simplicity, utility, and economy necessary to take the place of the ordinary wooden handle; nor do we think it possible to improve for most applications of the file, upon a wooden handle that is conveniently formed and properly fer-

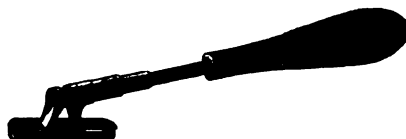


Fig. 1. STUB FILE HOLDER.

ruled, provided it be firmly affixed and carefully used. The Nicholson File Company now make two forms of handles, the straight ferruled and the spun ferruled, which, we are told, elicit the highest commendation from all users.

Devices for Holding Files.

The file, when used in the ordinary manner, considerably exceeds the length of the work; but when such is not the case, as in filing large table surfaces and shaping out recesses of considerable length, or when, from other causes, the ordinary handle will not answer, it then becomes necessary to grasp the file by holders of special construction. These special devices (many of which are quite rude) are numerous, and vary to suit the particular shape of the file and the work to be performed.

Short pieces of files of special construction are sometimes clamped to the slide rest, to be used upon work revolving in the engine lathe, and are soldered or screwed to bent handles when required to be used in finishing in and around the bottoms of shallow cavities.

The necessities, however, of this last and troublesome method of holding the



Fig. 2. A FORM OF BENT RIFFLER.

file may be avoided by the use of the Stub File Holder.

Wood workers not infrequently clamp one or more files to pieces of board, or fasten them by means of staples and wire pins, or by cutting in, in such a manner as will enable them to smooth out grooves, or true up the edges of their work, using the board or holder as a gauge.

Bent Riffles are sometimes required in reaching certain irregularly shaped cavities.

In filing large table surfaces, the tang is frequently bent upward, as in Fig. 3, A, to admit of the hands clearing the work when the file passes over

the surface; sometimes a crank-shaped holder is employed, having one end fitted to the tang of the file while the other is fitted to receive the handle, as in Fig. 3, B. These devices, while facilitating somewhat the handling of the file, do not give that perfect control which enables the operator to manipulate it at will, nor do they aid in governing its convexity.

The Surface File Holder, which is herewith illustrated, is designed especially to meet these points, thus enabling the skillful operator to do much of the work with the file which has hitherto been done with the scraper.

To have the file truly and firmly handled or properly affixed to a suitable holder is the first step in point of economy as well as in the production of good work.

(To be continued.)

Diseases of the Foot and Their Treatment.—15.

E. MAYHEW MICHENER, V. M. D.

Inflammation of the Flexor Tendons.

The above condition is common in the region of the cannon of the front limbs of the horse, and occurs more rarely in the hind extremities. Injuries of these tendons vary in intensity from complete rupture in the most severe cases to that of simple straining or pulling apart of the fibres.

Causes.

These may be classed as either predisposing or exciting. Among the predisposing causes, most prominent is the conformation of the animal; those with large, heavy bodies and light limbs are frequent subjects to the injury. Animals with long, slanting fetlocks are more liable than those with upright pasterns, other conditions remaining the same. A condition very favorable to injury of these tendons is the existence of long toes and low heels. This may either be in the length of hoof alone, or the same result may be obtained by shoeing with thick toed and low heeled shoes. Given the condition known as low heeled, it is apparent at once, that shoeing may either further endanger the accident, or tend to prevent it to a great measure, according to whether it be improperly or correctly done. The kind of work done by the animal plays an important part in the causation of this trouble. For example, saddle horses or hunters which are obliged to carry much weight at a rapid gait and possibly over rough roads are very predisposed. In animals used for heavy pulling, the accident is more frequently with the hind limbs than is

the case with animals used for driving or saddle purposes. When the injury does occur in the hind limbs, it is commonly the result of severe muscular exertion.

Symptoms.

The symptoms vary widely with the extent of the injury and the length of time that has elapsed. Lameness to greater or less extent is commonly present. The peculiarity of the form of lameness is that it is shown only at the time the weight is placed on the limb. Moving the leg at the fetlock joint when the foot is held in the hand is not painful to the animal. In stand-

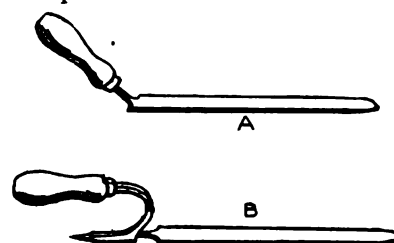


Fig. 3. TWO STYLES OF FILES FOR LARGE SURFACES.

ing, the heel is not as commonly held elevated as is the case in diseases within the hoof, but not rarely it will be noticed that the animal selects a resting place for the heel while standing, as, for example, he may prefer to stand on a slanting surface with the heel the highest. In the case of the hind limbs, the animal may place the heel of the shoe against the side of his stall. This position is taken to relieve tension upon the tendons. At the beginning of the trouble the local symptoms may be detected at the point of injury, pain on pressure, increased local temperature and swelling. The heat and pain may become much less after a few days, while the lameness of the animal may not improve. The swelling is at first soft and poorly defined, but later becomes harder and more clearly circumscribed. Long continued or repeated injury to the flexor tendons commonly results in a shortening of the length of the tendons; this causes the deformity known as knuckling at the



Fig. 4. SURFACE FILE HOLDER.

fetlocks. In order to determine whether the knuckling is due to actual shortening of the tendons, or to a desire on the part of the animal to avoid placing weight upon the limb, it is necessary to raise the opposite foot, when, if the tendons be really contracted, the additional weight will not remove the

knuckling. The prospects of recovery from injury to the flexor tendons varies with the severity of the injury; if both limbs are affected, the prospects are not so good. Repeated injuries tend to produce great thickening of the tendons and their sheaths, which, in severe cases, become bound together as one solid cord. The suspensory ligament may also be involved, which is an unfavorable complication. When the lameness is of long standing the prospects are unfavorable. If both legs are affected, the animal may suffer greatly and refuse to stand long at a time. In some cases the deformity continues to render the animal useless after all acute pain has subsided.

Treatment.

Rest is of the utmost importance early in the attack. The shoe should be removed, the animal should have a comfortable box stall if possible, which should be littered to a depth of four to six inches with fine shavings, or other short material. Cold applications should be made to the swollen and painful parts very frequently for the first two or three days. Spraying with a hose, having a spray nozzle, is an excellent way to apply cold water, or a small stream of cold water may be directed on the part from a small rubber tubing fastened to the leg by a broad bandage. Wrapping the leg with absorbent cotton, which has been immersed in ice water, is another good method.

After the first two or three days, moist, warm applications give better results than cold. For this purpose the parts are inclosed in several layers of absorbent cotton, which has been wet with quite warm water, and over the whole is to be applied white flannel bandages evenly and firmly, but not too tightly. The application should be renewed at least four or five times daily. In most cases the moist applications are kept up with benefit for five or six days, after which time lameness may be almost gone. The animal should have three to four weeks rest, however, as a precaution against the return of the lameness. If lameness persists, or if the enlargement is considerable, massage of the thickened parts is often of great advantage. The application of blisters is also of use to reduce the enlargement. Firing, either in points or in lines is practiced with advantage in well selected cases. The

toe of the hoof must be kept pared as short as will be borne without causing tenderness of the foot, and if shoes are applied, they should be wedge shaped, that is, with thick heels and thin toes.

If, after lameness has subsided, contraction of the tendons has produced marked deformity of the limb by knuckling of the fetlock, the only remedy consists in the surgical operation known as tenotomy. This consists in dividing the contracted tendon, or tendons, subcutaneously at the middle portion of the cannon. This operation requires a knowledge of the anatomy of the part and the practice of strict surgical cleanliness. The operation of tenotomy frequently gives surprisingly good results, but is somewhat costly on account of time required for rest. From six weeks to three months may be required. It is of the utmost importance that all, or



INTERIOR VIEW OF AN UP-TO-DATE SHOP IN TEXAS.

nearly all, pain be gone from the seat of injury before the operation of tenotomy is attempted, for, should pain be sufficient to cause the animal to place little or no weight upon the limb, then the divided ends of the tendon will not be kept separated, but unite in about the same relative length as before the operation. If, however, a fair amount of weight is placed upon the limb, the cut ends of the tendon are separated, and the space between is filled in with new connective tissue, thus giving to the tendon its normal length and strength.

(To be continued.)

A Glimpse of a Texas Shop.

From the Lone Star State comes a photograph of a typical shop, sent us by the proprietors, Knight and Livingston, of Temple, Texas. The engraving shows the rear view of the interior of the shop.

They have a five-horsepower Fair-

banks and Morse gasoline engine to pull a 36-inch band saw, a pony planer, a Universal woodworker, a rip saw, and a grindstone. On the deck in the corner will be seen a two-horsepower electric motor which pulls an emery stand, a drill press, a blower for four fires and two overhead fans. The pipe conveying the air to the fires may be seen along the wall to the right. They have a Henderson hand power tire setter; rubber tiring is also carried on in this shop. In front is a shoeing department with three shoers.

The building is 30 feet by 90 feet, one story high, veneered with brick, and a shed has lately been added, 28 feet by 60 feet. This latter is intended as a wagon repair department and for the carrying on of all bulky work. Thus the shop inside will be free of this inconvenience.

Knight and Livingston have been in business now for several years and have held their present location for two years.

The Scientific Principles of Horseshoeing.—18.

E. W. PERRIN.

Navicular Disease.

Navicular disease is a very serious malady affecting the under surface of the navicular bone, also the tendon flexor perforans, which passes over it. Fortunately, this disease is comparatively rare. It is commoner in horses that do fast work, but I have seen a few marked cases in draft horses. This disease is insidious in its approach. Many horses are affected with it for years before the lameness becomes acute. First, it attacks the smooth, glistening cartilage with which the articular surface of the bone is covered (see Fig. 91), and slowly the tendon and bone become implicated. Fig. 92 represents a specimen in which the hoof, skin, sensitive frog and a portion of the lateral cartilages is dissected off, and the tendon flexor perforans cut through at the back of the pastern and turned back so as to expose to view the seat of the disease.

In a veterinary school in England, I saw some twenty typical pathological specimens, showing the disease in its various stages of progress. In some cases—in the primary stage—the smooth surface of the bone had a few fine holes that would carry a pin's point; some were more deeply perforated,

like a worm-eaten piece of wood; some had patches of the cartilage eaten away; a few were perfectly honey-combed, thus making the bone so weak that you could snap it in pieces with the fingers. Up to the present day this disease has—so far as I know—baffled every effort of the veterinary profession

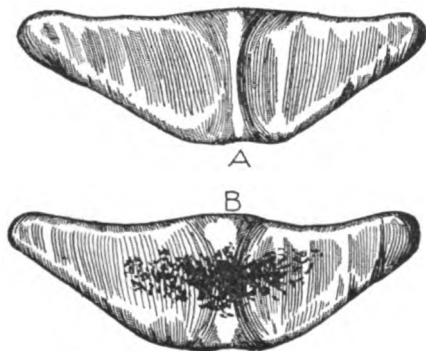


Fig. 91. A. THE NAVICULAR BONE IN HEALTH. B. THE DISEASED NAVICULAR BONE.

to effect a cure. I have heard all sorts of stories of blistering, firing, frog setons, etc., effecting a cure, but I have never known of a single case to be cured when the disease was once firmly established.

This disease is difficult to diagnose in the early stages, and I think some cases said to be navicular disease, may merely have been sprain of the navicular joint.

Symptoms.

In the early stages of the disease there is nothing to indicate its presence except a peculiar way of pointing the toe, and often the animal only does this when he stands still in his own stall. Generally, only one front foot is affected, but occasionally both feet are implicated. I have never seen it in a hind foot. This disease progresses slowly. Presently there will be a slight lameness, when starting out of the stable in the morning, which, however, works off in a few moments. As the disease advances it takes longer for the animal to "warm up" out of the lameness, until, finally, though going somewhat better with exercise, he is permanently lame, and he points the affected foot whenever he is standing still. He wears the shoe out rapidly at the toe, and is a chronic stumbler.

In its incipency, there is nothing in the shape or form of foot to indicate the presence of the disease. I have seen perfectly formed feet affected with navicular disease, but as the disease advances there is more or less contraction of the hoof and often some wasting—atrophy—of the muscles of the shoulder in addition.

Causes.

Hereditary predisposition and severe work are the most potent factors in the production of navicular disease. I know of two cases in which navicular disease began to develop immediately following a runaway on a hard road. I saw several cavalry horses develop it in the British Army. I have seen two well developed cases in heavy draft horses, but it is more commonly met with in road stock that do fast work. I believe the pacing horse is less prone to the disease, although records—so far as I know—afford no information on this phase of the subject; I have never seen a pacer with navicular disease. If any readers know of a pacer being affected I should be glad to have an authenticated history of the case.

Treatment.

This disease being incurable, treatment can only be palliative. The seat of the disease is the under surface of the navicular bone, over which the tendon flexor perforans plays, like a rope or belt over a pulley (see Figs. 92 and 93). Depressing the heels or elevating the toe places increased tension on the tendon—more pressure on the affected part. Hence, to relieve the affected part of pain, the animal raises the heel and points the toe, which position relaxes the tendon and eases the pain. This accounts for the well known fact that the navicular horse goes much better with the toe short and rolled and the heel raised by means of a swelled heel shoe. If there be contraction, treat as recommended for that disease in the September issue of this paper, but do not apply frog pressure, which in navicular disease increases the pain and lameness.

In every case that has come under my notice, the disease has run its course, defying all efforts at treatment. The best course to pursue is to put the animal to walking work, for, under such conditions, he may do several years of useful work before the lameness becomes acute. We have one such case here. This horse has done six years of slow work, and although very lame at a trot, it is scarcely perceptible at a walk. Do not breed from a mare affected with navicular disease.

Neurotomy as a Remedy for Navicular Disease.

Neurotomy, commonly called "nerveing," was a common practice many years ago, but it has long since fallen into disrepute as unscientific, as a remedy for navicular disease. The operation consists in making an incision in the

skin of the leg just above the fetlock joint between the back tendons and the canon bone, dissecting out the plantar nerve, cutting about an inch out of it and stitching up the wound. The operation is performed on both sides of the leg, thus cutting off nervous sensation in the foot, and the foot being thus freed from pain, there is no lameness, unless there be some mechanical impediment to the proper movement of the articulations, tendons, etc.

But destroying the sensation of pain does not arrest the progress of the disease. On the contrary it accelerates it. The animal, feeling no pain, makes no attempt to save the affected part from wear and tear, and as a result it wears out—the disease runs its course much quicker.

To illustrate, I will give the history of one case. I performed neurotomy on a heavy draft horse, belonging to a Mr. Dyke of Bath, west of England. This horse had navicular in both front feet, lamer in one foot than the other.



Fig. 92. DISSECTED SPECIMEN SHOWING SEAT OF NAVICULAR DISEASE.

The horse was too lame to be of any service, and I advised the owner to have him killed, but he was anxious to try the experiment; so the operation was performed on both legs, a few days apart. The wounds healed rapidly. All the lameness was gone, and the owner was delighted, but I told him the probable consequences, viz.: That a breakdown was sure to follow sooner or later, and on

that account, I advised him to work the horse on his farm a few miles from the city, which he did, making me a promise that he would let me know whenever anything happened the patient. It was about nine months from the date of the operation that one of

the farm hands came to my shop and said that while plowing, the horse got suddenly lame, and on investigation, he found that the foot was turned up in front and that the horse was walking

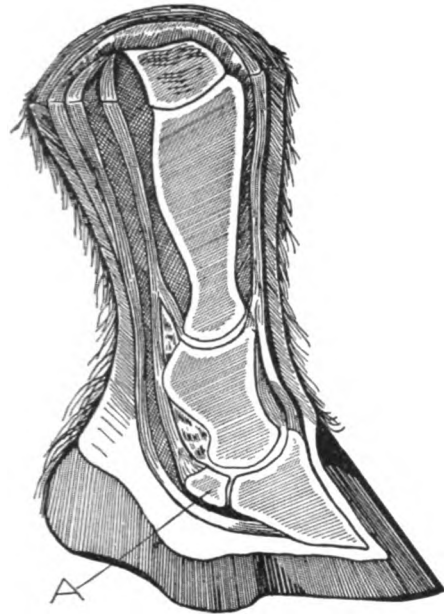


Fig. 98. SECTION OF FOOT AND PASTERN.
A, INDICATES THE LOCATION OF
NAVICULAR DISEASE.

on the end of his leg. I told the owner to have the horse killed at once, and to cut off the two front legs between the knee and fetlock and send them to me for dissecting purposes. On receipt of these specimens, I found that in the one in which the break-down had occurred I could bend the foot and pastern forward until it was at right angles with the canon bone—so that the foot and pastern were limp and useless, the end of the canon bone coming to the ground in walking.

I sawed both specimens through from top to bottom, cutting straight through the foot from toe to heel. In one, the tendon flexor perforans was severed where it passes over the navicular bone. Some four inches of the tendon at the seat of the disease was withered and discolored. The ruptured ends looked like the fibres of a rope worn through by friction. All the smooth cartilage was completely gone from the navicular bone, leaving a rough honey-combed surface. The same condition was in progress in the other foot, but not so bad. The tendon was worn some—it was only a question of time till it would have worn through, and when the last fibre gives way, the fetlock—losing the support of the flexor perforans—comes to the ground; there is a break-down, a collapse. The horse must then be killed. It is needless to say that if such a break-down happened to a buggy-horse

while at a trot, it would probably cause a severe accident to the driver. Again, in the unnerved foot, there is nothing to indicate the presence of injuries or foreign bodies in the foot, until extensive suppuration breaks out at the coronet. You may prick an unnerved foot in shoeing, but if it does not attract your attention by bleeding, you will not know it, because the animal does not flinch. When you do find it, by matter breaking out at the coronet, some very serious complications may have set in. So that in the final summing up, although neurotomy removes the pain, it, at the same time, accelerates the progress of the disease, and when a horse is too lame to do walking work it ought to be killed. Hence, when viewed from a scientific standpoint, neurotomy is not a remedy for navicular disease.

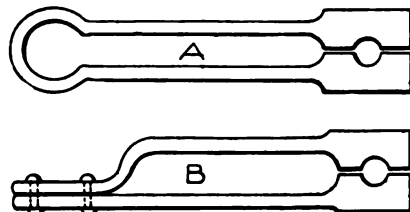
In conclusion, I would say that in shoeing for navicular disease, the shoes should be reset about every three or four weeks, because the abnormal growth of toe will cause increased pain. Elevate the heels and roll the toe to the degree indicated by the wear of the old shoe. If the frog is weak and thin, you can protect it from contact with the ground with a bar shoe. Arch up the bar so that it does not touch the frog. If thrush be present, treat as recommended for that disease. If the feet are hard and dry, moisten them with poultices or stop with wet clay. This is about all you can do; the disease will run its course, but the slower the work, the longer the horse will last.

(To be concluded.)

Two Different Forms of Hammer Swages.

S. H. HOOVER.

There is more than one way of making hammer swages, and, in the figure the form which I show at B is one which



TWO FORMS OF HAMMER SWAGES.

I consider much simpler and easier to make, and I also find it more serviceable, as the form shown at A will often break, whereas the other will not. Also it will be found much easier to forge the two-part swage, as only one-half of the stock needs to be handled at a time.



The following columns are intended for the convenience of all readers for discussions upon blacksmithing, horseshoeing, carriage building and allied topics. Questions, answers and comments are solicited and are always acceptable. For replies by mail, send stamps. Names omitted and addresses supplied upon request.

Setting Axles.—Will some one tell me the most simple and convenient way of setting axles?
JOHN MCCONNELL.

A Welding Inquiry.—I should like to have some brother smith tell me the best way to weld cold rolled steel and how to scarf it.
H. STROTTMANN.

Expanding of the Heels.—I should like to have some brother smith tell me some plan for making a hoof expander for contraction of heels.
ROBERT C. MENZIES.

A Toe Calk Question.—I should like to have some one tell me of a way to put toe calks and heel calks on horseshoes, both steel and iron, so that they will wear sharp.
ED. HAYDEN.

Softening and Tempering Brass.—I should like to know how to soften brass, also how to temper it and copper, and about the hardening and mixing of various metals. What is the best book treating of work of this kind?
W. C. GROHT.

Another Testimonial.—I would not do without THE AMERICAN BLACKSMITH. I obtained one recipe for a welding compound out of it, which is worth more to me than the price of two years' subscription.
J. M. REED, Sundance, Wyoming.

One of Many.—Enclosed please find \$1.00 for the renewal of my subscription for 1903. It would be almost impossible for one to get along without the paper, after once having taken it. One issue of the paper has been worth a year's subscription to me.
H. M. FINGAR,
Pleasant Plains, N. Y.

Tempering Small Springs.—In answer to an inquiry of E. E. Knapp, would say that a very good way to temper small spiral springs is to heat them to a cherry red and to harden in oil. To draw the temper—this can be done by blazing off the oil three times in the usual way.
B. B.

Cherry Red.—One brother advises to heat tool steel to a "cherry red" to harden. We also have a "Cherry-Heat" welding compound. If good tool steel is heated to a heat so that it will weld with any kind of compound and then cooled off in water, it will be useless as a cutting tool.
JOHN.

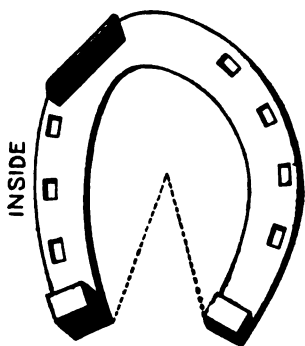
Welding a Buggy Spring Leaf.—I should like some brother smith to tell me a good way to weld a buggy spring leaf, and also how they should be tempered, or treated after welding, as they sometimes set.

Also I should like to know how to harden and temper the jaws of a bolt clipper.
H. H. WHITTEN.

Tempering Copper Springs—With regard to the question by Mr. Fred Barney on copper springs, I would say that when it becomes necessary to use a copper spring I have the steel on the inside covered with sheet copper, which protects the steel from acids and sulphur water. The same will appear a solid copper spring, fairly tempered. A. J. COOPER.

Ship Smithing—I should like to see some articles on ship smithing from brother craftsmen who have had experience in that line. For instance, how to make and adjust the iron work on a fore mast for a schooner or square-rigged sailing ship, for the main mast, the mizzen mast, lower yard, top gallant yard and other yards, or any work of this kind, which seems scarce. J. E. CLARK.

A Shoe for Interfering Behind—The accompanying figure shows a horseshoe, which I use in bad cases of interfering behind. In every case where I cannot straighten the ankles into plumb, I use this shoe. Nine-tenths of the interfering



A GOOD FORM OF SHOE FOR INTERFERING BEHIND.

behind is caused by the foot being too low on the inside, thus throwing the ankle in, which of course means that it gets struck.

The object of the shoe is to tip them out, and it is made with high inside and low outside heels, and with the toe calk inside, and nearly in line with the heel calk. I leave the inside straight, and turn the outside around close to the foot, and this, in my experience, will not fail to accomplish the purpose. O. P. TUCKER.

I Should Like to Ask How to Make a Weld—Where there is a great strain on a weld, a pick for example, after it is welded and finished and cold, is there any good done to the weld by reheating the pick at the weld to a dark red, then letting it cool? Does it make the steel any less liable to break off, just at the weld? Does it do iron welds any good to reheat them to a dark heat and then let them cool, for example, a chain on the rope to hoist a bucket out of a mine, when you want to make it as good as possible? W. F.

From the Editor: Several letters have recently been published in this department, mentioning benefits received by readers through THE AMERICAN BLACKSMITH. Letters of this nature form so large and representative a part of our correspondence that the Editor trusts our readers will not disapprove of a little display on that account. We are always glad to hear from subscribers, and especially to learn that they are deriving knowledge and benefit from the columns of THE AMERICAN BLACKSMITH. We are striving to make the paper of use and value to all readers. The three letters which follow are interesting in this connection, and we desire to reproduce them in full.

Editor American Blacksmith:

Enclosed please find one dollar. Please run my subscription for another year to your most valuable journal, the best of its kind that I have ever read. I have been taking your paper now for about a year and what I have learned in that time has been worth twenty-five dollars to me. If you ask three times the price for it, I should think it a cheap journal to such men and youths as mechanics, blacksmiths and horseshoers. H. A. CLINE, Tyrone, Ky.

Editor American Blacksmith:

I had no intention of letting my subscription to THE AMERICAN BLACKSMITH expire without a prompt renewal of the same, but my time has been so taken up outside of my regular work that I neglected to remit the amount of my subscription. I wish to thank you for sending the journal since my subscription expired and hope to receive every number in the future, for I am very much pleased with it. I have received several copies, any one of which I would give a dollar for and which I would not sell today for a dollar to any man. A. P. WETMORE, Clifton, N. B.

Editor American Blacksmith:

Your favor of January 23d received. I am not connected with the Yazoo & Mississippi Valley Railroad, though I use its letterheads sometimes. I used to be an engineer on this road, but on account of loss of hearing to a certain extent, I had to resign my position, so I opened a blacksmith, woodworking and general repair shop here. I have been around to the two other blacksmiths in our town and two in Jackson, La., but have so far failed to get a subscriber, but I have not given them up, for I cannot speak too highly of the merits of THE AMERICAN BLACKSMITH as a trade journal, for I am free to acknowledge that from it, I have profited more than I can say. Not being a blacksmith (I served my time as a machinist) when I started up in this business, I worked under many difficulties and ran up against jobs that nearly stumped me, until I got THE AMERICAN BLACKSMITH, and after taking it one year and reading its valuable articles bearing on the different phases of the trade, I am accredited with being the best horseshoer and general blacksmith in the community. This at a cost to me of \$1.00 paid for your paper, and a little effort and commonsense on my part. I could write you a book of the trials and tribulations I experienced in trying to do jobs that I now do with ease and in a workman-like manner, and all due to the teachings of your valuable journal. R. D. ANDERSON, Wilson, La.

Removing Bolts from Engine Foundations—Referring to the problem asked by Mr. George Gardner, I will give an account of the same kind of one that I have had with an engine of the Great Northern Paper Company of Millinocket, Maine. I took a bar of iron, two by four inches and twelve feet long for a lever. Then using a number of pieces of iron two inches in diameter and about four to eight inches long, I began at the bottom and forced them up with the lever, thus forcing the broken bolt out. C. C. THOMAS.

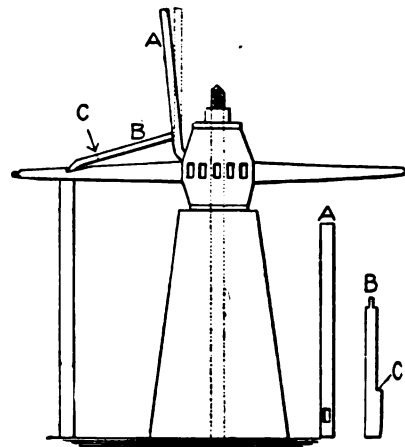
Heating after Forging—I would say in reply to Mr. Furbush's inquiry that I think it is always a good plan to heat a forging after it has been finished to a good red heat, and then allow it to cool without being touched. This tends to relieve all heating strains and strains produced by hammering at a low heat while finishing. This is good practice.

The ordinary practice of finishing off a forging at a dark red in order to give a smooth surface to the outside has a tendency to set up strains in the metal, as only the surface metal is worked at this heat. This reheating and slow cooling has the effect of annealing and tends to relieve the metal of these very injurious strains. JOHN L. BACON.

How Prevent Home Horseshoeing?—Seeing many questions asked in THE AMERICAN BLACKSMITH, I thought I would ask the above one. What I mean by home shoeing is farmers doing their own shoeing work. They will pick up old shoes out of scrap piles, or anywhere they can find them, and when they have ruined their horses' feet by rasping them to fit the shoes, they will bring them to the shop. This practice is making havoc in the shops of Kentucky, and I should like to know how it can be stopped. My idea is that a license, or tax, of \$5.00 be placed on every set of horseshoeing tools. I should like to hear from some brother smiths through THE AMERICAN BLACKSMITH on this question. J. B. M.

Fastening Spokes and Metal Wheels.—Answering the question on fastening spokes and metal wheels in the February issue, if Charles Sherman will hereafter try the Bush Metal Wheel, he will not need the information he seeks. However, we advise him to return broken-down wheels to the factory they came from, for he will have a picnic trying to remedy a fault, which the manufacturers of that wheel could not fix themselves. The wheel is of no account to repair, and can only be broken down and have the hub recast on. The trouble is that the construction strain was too great, caused by the shrinkage of the cast-iron hub, putting a great tension on the spokes, and in its efforts to release itself from the strain, the wheel went under. C. BUSH.

Removing Old Spokes—In answer to the question of Mr. Bruton as to removing broken spokes, I will give the way which I use and which I think is superior to putting the spoke in the vise and hitting the hub with a sledge. The accompanying drawing refers to my method. Take an old buggy axle about 1½ inches thick, and shape the piece A about thirty inches long. Cut a long square hole about two inches from one end, and round the



A CONVENIENT METHOD OF REMOVING SPOKES.

upper end of the piece for a handle. Take another piece twelve inches long, make a tenon on one end to fit loosely in the hole which has been cut in A, and also make a shoulder about two inches from the other end, bending the lower ends of both

A and B so as to give a good purchase. Fasten A to B with a thin bolt and the device is ready.

Place the extractor on top of the spoke in the position shown by dotted line, mark the end of B with pencil, cut a notch, place a stick just under the notch and apply the extractor. Pull on the lever and strike a sharp blow against the notch with a nail hammer, and in nine cases out of ten the spoke will come out. H. JOFFER.

Making Over Old Wheels—I have been thinking for some time that I would give my brother smiths a little scheme that might be worth something to them. It refers to taking the dish out of wheels and making them as sound as new. Put the wheel on the block, and after you have removed the tire bolts and taken the tire off, cut out every rivet in the hub and take out every other spoke, turn them over with the rear side in front, using glue, and set them away to dry. When dry, put back the rivets with a good rivet set, and then put on the rim, which will pull the spokes straight. You may have to put a piece of leather in the rim, and then put on your tire, but you will have a stout wheel. S. O. LOVE.

Mill Picks—The following receipt for tempering picks is one which I have used for over twenty-five years with good success:

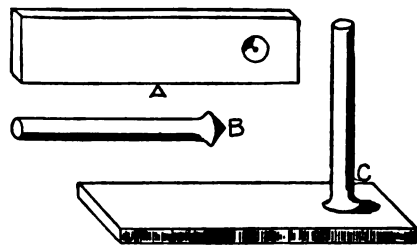
One ounce of sal ammoniac.
Half " " corrosive sublimate.
One " " alum.
One " " salt petre.
Half " " magnesia.
One " " borax.
One " " oil of vitriol.
One pound of salt.
Three gallons of soft water.

Care should be taken to work the steel in the way in which it is described by W. G. W. T. in the February issue. Heat to a cherry red, and cool. Draw no temper. This can be used for hardening stone hammers, drills, plow points, mouldboards, and in fact in every case where you need a tough, hard surface. I have used it with good success on edged tools by drawing the temper. R. R. TICHENOR.

Shoeing for Cross-Firing—In answer to W. L. P. on page 99 of the February issue, I would say that the horse referred to is a cross-firer, which defect is common in pacers, but never in trotting horses. To stop this, shoe very light in front, shorten the toe from the bottom all it will stand, and shoe behind with a side-weight shoe, having the weight on the outside. However, I prefer to make the shoe quite thin and light, punching the holes on the inside of the heavy side and letting the shoe project from $\frac{1}{2}$ to $\frac{3}{8}$ of an inch on the outside. This will always stop the cross-firing in my case. Be careful to lower the inside of both hind and front feet, and if there is a wing on the inside rasp it off before fitting the shoe. JESSE LEWIS.

Interfering—I have a little theory about interfering, and right here would say that it is very easy to stop a horse from interfering, when you know how. For instance, a horse that strikes his ankles behind, take and toe your horse in and set the toes on your shoe so that the horse's foot will look at the bottom as if he toes out. Be sure that you have the toe at an angle of about twenty-five degrees. Fit the inside close and leave the outside long enough to trail. Make your trail on the outside, and when you have it trailed turn your shoe over the horn of the anvil and throw the trail straight out from the shoe. Lower the foot on the outside, and, according to my experience, the horse will not strike at all. L. M. SARGENT.

Scarfing for Special Welding—In the February number, Edward Adam asks a few questions. I shall answer one of them for him. He wishes to know how a piece of round iron should be scarfed which is to be jumped on to a piece of flat iron, so as to stand perpendicularly on the same. Take the round piece, B, and back it up, cone-shaped, leaving an edge all around and a point in the center. Take the flat piece, A, and with the small end



TO WELD A ROUND TO A FLAT PIECE OF IRON.

of the hammer hollow the same as the round piece, and then punch a very small hole in the center of the hollow on the flat piece to let the gas escape. Take a good welding on the two, jump the round on the flat, C, and turn it upside down. Put into a heading tool and give it a few strokes, or go around the edge of the lip with a small fuller. Hollow the flat piece about $\frac{3}{8}$ or $\frac{1}{2}$ inch deep, as seen in sketch. WM. H. KATHERMAN.

A Home-Made Blower—Having read THE AMERICAN BLACKSMITH with much interest and having learned from others, I will try to write a few lines to help my brother craftsmen. I have a blower in my shop, made from an old bicycle, which is hard to beat. The following is the way in which the same was made: Take the fan from an old blower and bolt it to a plank. Now with a piece of old tire, make two braces for the wheel. Taking a piece of wood, 3 by 2 $\frac{1}{4}$ inches for the post, bore a $\frac{3}{4}$ -inch hole and cut out for the ball cups on each side, and welding a few in on one of the pedals for a crank. The post is bolted to the plan with two strap bolts and a brace with two nuts so as to tighten the chain. A piece of $\frac{3}{4}$ -inch oval iron bolted on the wheel helps to steady the speed. My fan revolves fifty-four times to the crank once, and only takes eight pounds to turn. I hope this will help some brother smith to get a good and cheap blower. L. A. BRENNAR.

A Question on Melting Rubber—Can some one tell me of a process of melting rubber, that is, melting the solid rubber so as to fill a casting or hole or groove in any other soft substance? R. E. B.

To Digest Old Rubber—Place the material, cut in small shreds in a strong, (boiler-iron) air-tight vessel, provided with a safety valve, and introduce into it four or five parts of bisulphide of carbon for each part (by weight) of rubber. Close all the openings and place the vessel over a suitable water-bath, or, what is better, have a steam-coil inserted within the boiler. Heat for an hour at the boiling point of water. This will ensure the complete solution of the rubber. The vapor of the bisulphide is very inflammable and when mixed with air, it is explosive when ignited. For these reasons as well as for the offensive odor of the solvent, the operation is best conducted in the open air and with steam heat only. This swells into a pasty mass and may be moulded into any desired form, or passed through a die of a tubing machine. B.

Another Method of Spoke Pulling—In the January number of THE AMERICAN BLACKSMITH, Mr. Bruton asks about removing spokes from the hub. I should say get a spoke puller. In the meantime, one way to do it is to place the hub on the wheel bench, face down if it is a light wheel, taking hold of the end of spoke and working it up and down, and especially down. If the spoke is too brittle, or too heavy to bend, put a clamp on the spoke one foot from the hub and a prop under the clamp reaching to the floor, bracing out from the hub. Swing a light sledge over the hub and strike the clamp. The concussion and the bracing prop draw the spoke out. If there is no clamp at hand, cut a notch in the spoke, straight on the outside, and slanting down to the hub. Strike in notch instead of striking the clamp. Be sure to have the prop solid and in right position, so that the spoke will not be broken. The clamp can be made out of two pieces of iron $\frac{1}{2}$ by $1\frac{1}{2}$ by 8 inches curved in the middle along the spoke, and fastened together at the ends with bolts or thumb screws. This is my way. E. H. HOEL.

The Use of Toe Clips—Referring to the remarks of Wm. F. on page 100, I suppose he will agree that the toe of the hoof is the strongest part of the foot, and therefore should take the most strain, either shod or barefooted. It is a well-known fact that the toe clip when properly applied puts the strain on the toe instead of the quarters where the nails are driven. With the use of the toe clips you can use smaller nails and hold your shoe in better position. I admit that a man may hurt a horse with toe clips, but he is more apt to hurt him with big nails or a shoe that is not level, or one that is too narrow.

He also claims that the clip retards the desirous growth of the foot. This is hardly so, because the foot grows at the coronary band, and thus shoves the toe clip, nails, old horn and sole all down together. The only trouble that may arise is that the nails on the quarters will not allow the shell to spread as it is pushed down, and therefore if left too long will draw in the wall of the foot and cause contraction.

As to clapping a red hot shoe on the foot, I wish to say that any man who understands his business will fit a shoe hot. Great care must be taken, however, not to hold the shoe on long enough to burn the horse's foot. JESSE LEWIS.

Welding Toe Calks—I wonder if most horseshoers leave the old toe calks on when they become pretty well worn, and weld the new ones on top of them, or do they remove the old ones as I do. I shall endeavor to tell how this is done. Heat the old toe to nearly a welding heat and place it in a vise with the calk far enough from the vise to put an old rasp between the calk and the vise flatways. Then lift on the rasp, and with a little practice you will be able to do the trick and have no more trouble in welding than with a new shoe.

I saw in the December number that D. J. Lessel and B. B. Mallory tell about removing spokes from old wheels. The way I do it is to have two or three rings, or bands, according to the size of the spoke, and slip one on it which is a little larger than the spoke. I then take my shoe punch, or some other punch with a taper on it, and drive it from the hub side between the band and the hub. Then by driving against the punch, the same as they drive against the notch, the spoke may be removed. The punch never splits, as the notch sometimes does, and further, the rings and punch are always ready.

I think Mr. T. J. Wallace's ideas about welding axles in the October issue are very good, and I also agree with Mr. W. L. G. in what he says about good-natured kicks. I read this article to a customer of mine and he was not at all slow to take the hint.

R. W. SCOTT.

Another on Spoke Pulling — Referring to the plan of Mr. J. P. Wingard for pulling old buggy spokes, I think the ring and wedge plan is too much bother. If he will use the upright post and strike just over the inside line of the post, he will have the same result, using a hand ax or a sharp-faced hammer. I have tried both ways and like this the better of the two. The way I draw spokes is to strike the spoke on the front side, close to the hub. Do not strike hard enough to smash the spoke. Use light, quick blows, and you can start any spoke that can be drawn.

I see that W. L. P. names over a list of customers that are found in every community, but he has left one out, which I think is the worst of them all, and that is the man whose credit is good, who gets his work done, giving you to understand that the cash is ready when the work is finished, but when it is done he says, "I am a little short of money today; you will have to wait until I come again." It may be that you have used money to do his work which you wished to use for other purposes, and you have to wait his pleasure. If you ask him for it, he will get mad or say "I forgot it," when he is able to pay and you need the money.

I would like to see all of the brothers of the craft rub off the rust occasionally, and send items to THE AMERICAN BLACKSMITH which will be of benefit to someone else, if they are to us. We can extend each other a helping hand in this way. Pass along a good thing. R. R. TICHENOR.

A Word of Encouragement — Your paper gives an opportunity to all workers in iron, especially to horseshoers. Even our veterinary text-books, many of them serve only for exhibition in book or show cases. But this journal is practical and indispensable to the smith who wants to do shoeing properly. The question of scientific horseshoeing must appeal to any man with humanity, yet the majority of smiths and shoers stick to ancient and even barbaric methods. For instance, they treat corners and gravel bruises with the same knowledge that our ancestors started on three hundred years or so ago. And these same men post shop signs reading, "Scientific Horseshoeing."

Although a question may seem foolish, it is important to the questioner, and this journal has many subscribers who are willing to explain when necessary, thus educating and destroying prejudice in fellow craftsmen. A young man properly educated and trained in pathology of the horse is as competent a shoer as an octogenarian smith without such training. But reform in any line always meets with opposition. Such men as Michener, Perin, Kenyon and others need not be discouraged in their efforts towards enlightening less experienced craftsmen. Opposition often has good results. It attracts hearers and spurs the mind to new thoughts. When opposition is offered it is met with due consideration, and the point under argument is satisfactorily explained to the benefit, not only of the questioner, but of thousands of others, widening our interests. ROBERT MOSER.

Brass and Copper—I find that a useful book to have on such subjects is The Metal Workers' Handy Book, by Brant, containing receipts for hardening and

tempering copper and brass and for softening alloys; also the composition of all kinds of alloys for various uses, solders and metals for castings are given.

Copper, if heated to redness in contact with air, oxidizes and forms a red scale, but if heated to a lower red it may with care be worked like iron by the smith.

To harden or toughen copper, one to sixteen per cent. of manganese oxide may be mixed with the copper in a crucible. After melting and thorough stirring, the scum should be carefully removed and the copper is ready for casting. In case of brass this process is carried out just the same and the zinc added.

In mixing metals, the following points are useful and may be mentioned: The least fusible metal should be melted first, unless in such small quantities that they will readily dissolve in the more fusible. The metals requiring the greatest heat should be placed in the melting pot first, and no other metals added until those already in the pot are thoroughly fused. Do not apply the heat too quickly to an alloy, as the more fusible will melt and "sweat out" before the others are fused.

Copper and tin alloys have the property of becoming much softer and ductile when cooled. Heat to a dark red, or to the melting point of lead, and immerse in water. The alloy thus treated can be worked under the hammer and straightened without cracking. B. B.

Gold Striping on Vehicles — Reading the February number, I saw an article in regard to gold striping on vehicles, and as I am not a professional painter, but have a great deal to do in summer seasons and have seen a great many buggies with gold stripes, I tried to get it from jobbers that I deal with in Baltimore, but they say they can't find it, so please be kind enough to write me at once something about it and where I can get it, as I would like to have some at once. Also please explain in full through your valuable paper how it is used, and if it is put up in tubes like other striping, etc. We have one or two painters in the county, but they are as green as I am in regard to it, so that I appeal to you. J. H. TAPSCOTT.

The gold striping referred to by Mr. J. H. Tapscott is done with gold bronze powder, which may be bought in a dry state of Geo. E. Watson, 108 Lake Street, Chicago, Ill., whose advertisement may be found in THE AMERICAN BLACKSMITH.

Mix the bronze for striping purposes in two parts pale drying japan and one part elastic finishing varnish. To perfectly remove the verdigris solution, which is a characteristic of gold bronze, first mix up about the quantity of bronze desired for use with turpentine and stand aside. In a few hours a strong percentage of the verdigris will float to the top and may be poured off with the turpentine. Again pour on a fresh supply of turpentine, and when more verdigris appears empty the fluid.

This will give the bronze when mixed with the japan and varnish a cleaner, brighter lustre and increase its durability. Mix only as fast as needed, as when newly mixed it works better. In using, keep the pencil washed out in turpentine so that no gumming accumulations get into the "heel" of the pencil to injure its elasticity. Keep the palette clean, and if the gold is inclined to show laps where a fresh filling of the pencil lays onto the line previously drawn, add a trifle of flake white to the gold. A little practice will enable Mr. Tapscott to stripe with the bronze as nicely as with ordinary paint, and as easily. M. C. HILICK.

Shoeing Special Cases—For contracted feet, the first thing to do is to get the feet soft and keep them so, to get rid of the fever which is in the feet, for I have never found a contracted foot but what there was more or less fever in it. Poultice the feet with hot bran, scalded with hot or boiling water. If you have nothing better, cut off an old pair of overalls at the knee, sew them up at the bottom and when the bran is cool enough, so that you can put it in the sack with your hand, put it in the sack, place the horse's foot in the same and tie on at the fetlock, or just above the foot. Leave it on until the foot begins to look white below the hair. After the foot is softened, fit the shoe close around the heel and pare the feet as low as possible at the heel as well as the toe. Then bevel the shoe at the heel, so the hoof will have a tendency to slip off the shoe at the heels. As perhaps the above is not plain I will try to make it a little plainer. Make the shoes a good deal thinner on the outside that comes in contact with the bottom of the hoof, and you will have excellent results if you will keep it up long enough. Shoe the horse in this way every time and if the feet begin to get hard, soften them up again.

Hitching or hopping behind with one leg is another puzzler. I have shod that kind of a horse in every possible way I have heard of, but without any good results. I was at Leland Stanford's farm in '87, and went into his blacksmith shop. He had his own shop, and always kept the best horseshoers he could find. While I was there they were shoeing some colts, and I noticed that they were shoeing one colt behind on one foot with a full shoe and on the other with a half shoe. The half was on the outside of the hind foot, and I asked the blacksmith why he did not put on a full shoe on that foot as he did on the other. He told me he was a hitcher or hopper, and that the method he used never fails, and that he placed the half-shoe on the foot with which he hopped. I felt more than repaid for going, and was in a great hurry to return home, as there were two horses which I was shoeing which were valuable before they commenced hopping. I had used all kinds of methods, but could not help them at all. As soon as I arrived I went to see my customers with the hopping horses, and told them to get them to the shop as soon as possible, for I had found the medicine for them at last. So I put on my half-shoe and I said to them, "you can't make them hop now," and I was sincere, for I got the remedy right at headquarters. So after I shod them, I went down the road to see them go level for the first time since they were four years old, and this was two years later, but to my sad disappointment they hopped as badly as ever, and I haven't been back to Stanford's farm since for pointers. Now when a customer tells me that his horse hops when he tries to speed him and asks me what to do for it, I tell him to trade him off and let the other fellow find the remedy, but if any brother smith can tell me a way to shoe him so he will not hop, I will be very glad to hear from him. I have a horse of my own that is a bad hopper. He can go at a three-minute gait, but could go much faster if it wasn't for that hitching. You might want to know his age before you could prescribe for him. He is eighteen years old, sixteen hands high and weighs 1225 pounds.

Wishing THE AMERICAN BLACKSMITH a prosperous year, and hoping for a speedy reply that will solve this troublesome problem and give my horse a normal gait, I remain, N. T. OUTWATERS.

Prices Current — Blacksmith Supplies.

The following quotations are from dealers' stock, Buffalo, N. Y., April 1, 1906, and are subject to change. No variations have occurred since last month's figures.

All prices, except on the bolts and nuts, are per hundred pounds. On bars and flats prices are in bundle lots.

Bars—Common Iron and Soft Steel.			
$\frac{1}{2}$ in., round or square; Iron, \$3.10; Steel, \$2.90			
$\frac{3}{4}$ in., " " " 2.70 " 2.70			
$\frac{1}{2}$ in., " " " 2.50 " 2.40			

Flats—Bar and Band.			
$\frac{1}{2}$ x 1 in., Iron, \$2.50; Steel, \$2.40			
$\frac{1}{2}$ x $1\frac{1}{2}$ in., " 2.40; " 2.40			
$\frac{1}{2}$ x $1\frac{1}{2}$ in., " 2.60; " 2.60			

Norway and Swedish Iron.			
$\frac{1}{2}$ in., round or square, \$4.90			
$\frac{3}{4}$ in., " 4.50			
$\frac{1}{2}$ in., " 4.80			
$\frac{1}{2}$ x 1 in., " 4.80			
$\frac{1}{2}$ x $1\frac{1}{2}$ in., " 4.20			

Horseshoe Iron.			
For No. 1 shoe, $\frac{1}{2}$ x $\frac{1}{2}$ in., \$3.40			
For No. 2 shoe, $\frac{1}{2}$ x $\frac{3}{4}$ in., 3.00			
For No. 3 shoe, $\frac{1}{2}$ x $\frac{3}{4}$ in., 2.90			
For No. 4 shoe, $\frac{1}{2}$ x $\frac{3}{4}$ in., 2.90			

Toe Oak Steel.			
$\frac{1}{2}$ x $\frac{1}{2}$ in. and larger, \$3.50			

Spring Steel.			
$\frac{1}{2}$ to $1\frac{1}{2}$ in. Rounds, Op. Hearth \$4.00, Crucible \$6.00			
$1\frac{1}{4}$ to 6 in. by No. 4			
gauge to $\frac{1}{2}$ in. Flats " 4.00, " 6.00			

Carriage Bolts. (Net Price per Hundred).			
$\frac{1}{2}$ x 2 in., \$0.54	$\frac{3}{4}$ x $2\frac{1}{2}$ in., \$0.82		
$\frac{1}{2}$ x $2\frac{1}{2}$ in., .58	$\frac{3}{4}$ x 3 in., .96		
$\frac{1}{2}$ x 3 in., .62	$\frac{3}{4}$ x 6 in., 1.31		
$\frac{1}{2}$ x 4 in., .65	$\frac{3}{4}$ x 4 in., 1.70		
$\frac{1}{2}$ x 8 in., .75	$\frac{3}{4}$ x 6 in., 2.10		

Tire Bolts. (Net Price per Hundred).			
$\frac{1}{2}$ x $1\frac{1}{2}$ in., \$0.18	$\frac{1}{2}$ x 1 in., \$0.28		
$\frac{1}{2}$ x 2 in., .21	$\frac{1}{2}$ x 2 in., .31		
$\frac{1}{2}$ x 3 in., .27	$\frac{1}{2}$ x 3 in., .37		

Hot Pressed Nuts. (Blanks).			
$\frac{1}{2}$ in., \$0.09 lb. net			
$\frac{3}{4}$ in., .08 " "			
$\frac{1}{2}$ in., .06 " "			
$\frac{1}{2}$ in., .04 7-10 " "			

NOTE.—Base prices for most common sizes are listed above. Should subscribers desire net prices upon other sizes than those given, same will be published in following issues.

CUMMINGS & EMERSON,

Blacksmith and Wagon Makers' Supplies.

PEORIA, ILL.

WANTED AND FOR SALE.

Want and for sale advertisements, situations and help wanted, twenty-five cents a line. Send cash with order. No insertions of less than two lines accepted.

WANTED—Carriage blacksmith and platform blacksmith.
COLUMBUS BUGGY CO., Columbus, Ohio.

WANTED—A reliable young man with some experience in blacksmithing. A good chance.
M. F. AMES, West Kendall, N. Y.

FOR SALE—Gasoline Engines, second-hand, rebuilt, from two to ten horse-power.
CAPITAL GAS ENGINE CO., Indianapolis, Ind.

FOR SALE—On easy terms if sold at once, one of the finest stone Blacksmith and Horse-shoeing shops in the state in fine growing town. Owner wishes to retire from blacksmithing.
A. G. BIRNSON, Berthoud, Colo.

FOR SALE—My shop and tools complete. Best location in Central Illinois; no competition; cause for selling—owner wishes to retire from blacksmithing. For particulars, address
T. E. LARSON, Box 45, Pardue, Ill.

FOR SALE—Blacksmith and wagon shop and residence property. Also tools and stock. Have new gasoline engine, five horse-power. Good location. No competition. Good reasons for selling
JNO. F. PINNE, Otho, Webster Co., Ia.

FOR SALE—Cheap. New treatise on Steel, Welding and Forging all the new steels, and welding compounds for same. Also Thermite welding explained, with seventy-five new steel working methods and recipes. Also two-colored scientific Tool Tempering Charts, A and B. All the above for one dollar. Samples free. Anyone having bought my recipes can have the new treatise for 25 cents in stamps.
W. M. TOY, Sidney, Ohio.

FOR SALE—Blacksmith and Wood Shop, 36 by 46 feet, stock and tools. Ten horse-power gasoline engine, power hammer, emery grinder, grindstones, two drills, screwplates and pipe tools, two forges, bench tools, and other items. A good outfit, plenty of work for two men the year round and more in harvest. Centrally located in the best farming country in Oregon. Good prices. A good place for a good man. Retiring on account of health.
W. H. SAYER, Adams, Oregon.

NICHOLSON FILE COMPANY

PROVIDENCE, R. I., U. S. A.,



NICHOLSON.

MANUFACTURERS OF

**FILES AND RASPS**

Blacksmiths Recommend our Rasps.

BECAUSE*Their Wearing Qualities Have Been Proven.***Hand Forged Butcher Knives**

Ground, Tempered and all ready for the handles, either round or riveted, for 15 cents each or \$1.50 a dozen. All sizes from 5-inch to 8-inch. These blades are made from Sanderson Steel and warranted. Will replace any imperfect knife with two new ones.

Handles all ready to put on, one cent each.

Try a sample. Hundreds of Smiths are using these blades and make money and friends selling them. Liberal discount in quantities. Address

WOODWORTH KNIFE WORKS,

- NUNDA, N. Y.

ESTABLISHED IN 1876.

LANG'S TIRE BOLT WRENCHES

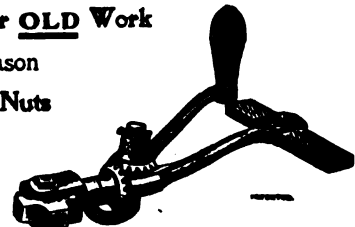
PATENT

The most CONVENIENT Wrench for NEW or OLD Work

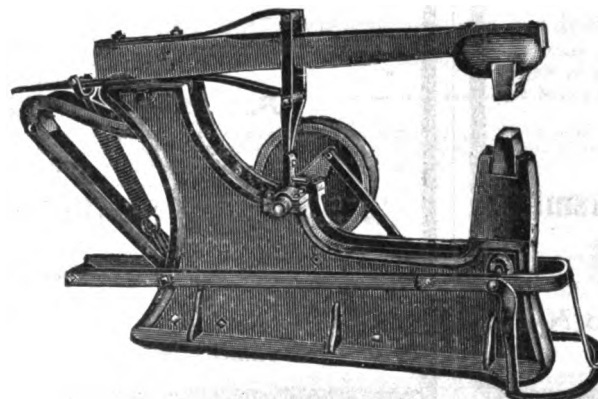
Will save its cost many times in one season

Will put on or take off QUICKLY $\frac{1}{2}$, $\frac{3}{4}$ and $1\frac{1}{2}$ Nuts

For sale by all Heavy Hardware Jobbers, or will be sent to any part of U. S. prepaid for

\$1.25

Miller Wrench Co., Fort Wayne, Ind.

BICKNELL'S POWER HAMMER

Simple in construction. Fewer parts than any other hammer. Solid forged crank shaft. Designed for carriage factories, blacksmith and machine shops. Our price will interest you. Write for catalogue of hammers, punches, shears, emery grinders, buzz planers, etc.

THE BICKNELL
HARDWARE CO.14-16 N. ACADEMY ST.,
JANESVILLE, WISCONSIN.

SPECIAL

THE edition of "The Village Smithy" is limited. While they last we make the following special offer—

For \$1.00 we will send—

**The American Blacksmith for one year,
A Copy of "The Village Smithy,"
and
A Premium—A Hoof Knife or a Pocket Level.**

THIS is to induce Blacksmiths, Horseshoers and Wheelwrights, who do not know THE AMERICAN BLACKSMITH, to become acquainted with the paper and read it regularly.

DO NOT MISS "The Village Smithy"

IT IS a beautiful and faithful reproduction in twelve colors of a valuable picture painted expressly for us by Raphael Beck. A handsome picture for framing. If not a subscriber, take advantage of the above liberal offer while it lasts. Send \$1.00 now so you won't miss "The Village Smithy."

And You Get Your Choice of Two Premiums—

A strong, serviceable Farrier's Hoof Knife, Crucible Steel and Bone Handle,

OR

A Handy and Dandy 3¼-inch Pocket Bench Level, Neat and Useful.

NOTE.—Send us two new subscribers and get a serviceable gold fountain pen as a premium. Include your own name as one if not already a subscriber.

A copy of THE VILLAGE SMITHY, carefully packed in a pasteboard tube, will be sent prepaid to any address, together with a sample copy of THE AMERICAN BLACKSMITH, for 25 cents.

You Will Find that THE AMERICAN BLACKSMITH itself is the biggest dollar's worth that goes into your shop. Twenty pages of solid reading matter guaranteed each month from the brightest writers of the craft. No trade puffs or stale clippings. Read on page 131, what we are doing for the craft. We are going to get 30,000 subscribers this year—will you be one of them?

WHEN sending subscriptions, state premium desired. Send money by Registered Letter, Express Order, Stamps, or Money Order, but not checks.

**American Blacksmith
Company**

P. O. Drawer 974 Buffalo, N. Y.
U. S. A.

Trade Literature and Notes.

Wells Bros. & Company, whose handsome and striking advertisement appears on page III, have just sent us their latest



catalogue, 120 pages, of screw cutting and labor-saving tools. This firm manufactures a long and complete line of tools and appliances well known to the trade under the name "Little Giant," and intended for blacksmiths, horseshoers, wagon builders, machinists and repairmen. Thread and screw-cutting tools form a large proportion of their line; they turn out large quantities of "Little Giant" Taps, Dies, Screw Plates and Collets. The accompanying illustration indicates how these goods are turned out. The catalogue above mentioned is mailed free upon request, and is worth the asking.

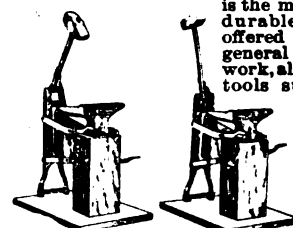
Wells Bros. Company, in twenty years, have built up a large business, their factories now occupying 40,000 square feet and employing upwards of 200 men.

The Havana Metal Wheel Co., Havana, Ill., whose advertisement appears on page XXVII, sent us several interesting circulars dealing with their line of metal wheels and plow adjuncts. They desire us to inform all plow repairmen that they have lately invented a gauge for determining the proper length and angle to cut land-sides on Eveready Plowshares. They are selling them for 25 cents, but furnish one free with each first order for Eveready

Plowshares. Directions for using and for fitting the shares accompany each one.

G. Fred Collins has resigned his position with B. M. Jones & Co., Boston, Mass., and will be succeeded in the Eastern department of their business, on April 1st, by Richard L. Thomas, long and favorably known in the Railway Supply trade. Mr. Thomas will continue to act for the National Lock Washer Company also.

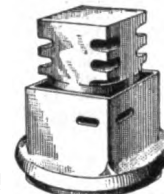
The Modern TRIP HAMMER



is the most practical and durable machine ever offered to the trade for general forging and plow work, also for striking on tools such as chisels, punches, flat-ters, swages, etc. It is easily operated and will strike just as light or heavy as desired, and practically will save the work of one man. Write at once for price and descriptive circular.

AUG. L. LOCKREM, Pierpont, S. D.

SURE CURE FOR WOBBLES



**The Terry Patented
Extension Axle Nuts**

**Make an Old Buggy
Run like New**

Profitable to the Blacksmith and satisfactory to the User. SATISFACTION GUARANTEED.

Large saving over cost of new stubs and boxes. Trial set by mail post-paid, \$1.50; when ordering give size of square section of axle next to wheel. Special prices for quantity lots. Descriptive Circular on application.

Stops the Rattling

**PONTIAC HARDWARE SPECIALTY CO.
PONTIAC, MICHIGAN.**

"R. Mushet's Special Steel" The Original Air-Hardening Steel

and STILL UNAPPROACHABLE in general excellence.

Thirty Years' Experience in Engineering Works in all parts of the World has proved Beyond all Doubt that this Steel is in every respect

THE BEST TOOL STEEL

YET MANUFACTURED

Uniformity of Quality in Every Bar. A Great Saving in Steel, Time and Wages, and Easy to Work. There are no difficulties to contend with in forging R. Mushet's Special Steel into tools and no loss in reheating. The best all-round Steel.

R. Mushet's HIGH-SPEED Steel.

If a fast-cutting steel is required, this is the best and most reliable of this grade. It will do more work than any other known steel, and every bar is uniform and free of the "Cracking" so generally a feature in steels of this grade.

The "R. Mushet's" Steels are manufactured only by **SAMUEL OSBORN & CO.,** Clyde Steel & Iron Works, Sheffield, England.

Sole Representatives in the United States, Canada and Mexico:

B. M. JONES & CO.
159 Devonshire St., BOSTON. 143 Liberty St., NEW YORK.

EXCELLENCE OF PRODUCT



WEBER ENGINES

Are in use in EVERY State in the U. S. and in every foreign country.

7500 WEBER JUNIOR ENGINES
ARE IN USE IN ALL PARTS OF THE
WORLD GIVING SATISFACTION.

WE GUARANTEE all WEBER engines to be of the very best material and workmanship, and agree to replace any defective part, F. O. B., our own works, without cost for two years. We guarantee fuel consumption and interchangeability of parts. We guarantee the speed to be steady. WEBER GASOLINE ENGINES operate on one-tenth of one gallon of gasoline per horsepower per hour.



The 2½-Horsepower WEBER JUNIOR as it appears at work.

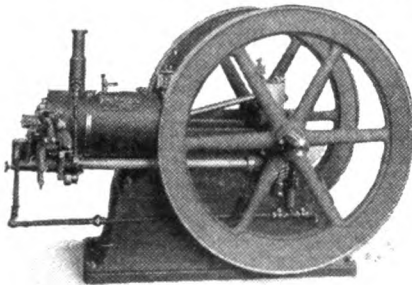
.. OUR NEW .. CATALOGUE

Just out—gives much interesting and valuable information about gas engines. Also over 100 endorsements of the WEBER from blacksmiths and others. It should be in the hands of every blacksmith, wood-worker and shopowner. FREE. Send postal for it.

The Junior is shipped (crated) with all fixtures attached ready to set up and run, requiring no pipe fitting or connections—it is HORIZONTAL not Vertical. A horizontal engine is stiffer, safer, stronger and will last longer than any vertical engine on earth.

5 H.P.

This is another Blacksmith specialty we are building that is proving most satisfactory. Has electric and tube igniters, gasoline pump, underground tank, sensitive governor and all latest improvements.



5 H. P. WEBER.

GUARANTEED ABSOLUTELY O. K.
EVERY ENGINE CRITICALLY TESTED BEFORE SHIPMENT.

Other sizes up to 300 H. P. in Engines and Hoists.

19 Years keeping everlastingly at it has developed the "Weber" to its high state of perfection.

PRICES owing to our exceptional facilities and the large quantities going through our factory, we are able to make the prices, like the engine **RIGHT**

Every Engine Sold is an Advertisement.

ADDRESS FOR PRINTED MATTER :

Every User of a WEBER is an Endorser.

Weber Gas and Gasoline Engine Co.

P. O. BOX, V 1114.

KANSAS CITY, MO.



Newton's Horse Remedy. The
temper and indigestion cure.
A veterinary specific for wind,
thrust and stomach troubles.
Strongly recommended. \$1 per
can. Dealers, mail or Ex. paid.
Newton Horse Remedy Co.
(3) Toledo, Ohio.

Bolster Springs

ALSO WAGON SEAT,
TRUCK AND PLATFORM SPRINGS

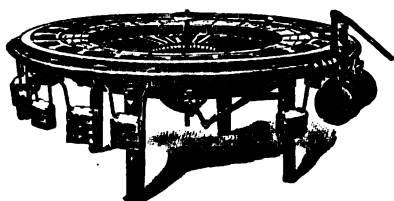


Sold by leading Jobbers, or write us
HARVEY SPRING CO.
RACINE JUNCTION, WIS.

THE HERCULES HYDRAULIC TIRE SETTER

Hand or Power
For Repairer or Manufacturer

QUICK TIME

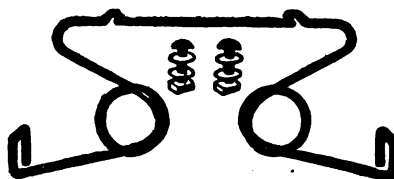


PERFECT WORK

It will set
A TIRE PER MINUTE
by hand
A sixteen-year-old boy can work it

Write for Circulars and Prices

NATIONAL MACHINE CO., KEOKUK, IOWA.



King Patent Seat Spring

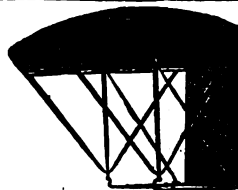
Only four bolts used, a saving of eight-
teen parts for each set of springs
Every set warranted Price much less than old time springs

W. A. Walker, Sole Manufacturer, 40 9th Street
RACINE, WIS.

The Best Tops

TOP No. A.

Full enameled drill, good green or
blue lining, elm bows. Back and
side curtains, colored
back drill. Less rail, **\$4.50**



The Least Money

TOP No. D.

Full rubber, 24-oz., 8-oz. all-wool lin-
ing, back and side curtains, colored
back rubber. Hand
stitched front and back, Less rail, **\$6.50**

SEND FOR THE 1903 "RED BOOK."

Iron, Steel, Carriage and Wagon Hardware, Etc.

**Fort Wayne Iron Store Co., 1397 to 1403 Calhoun St.,
FORT WAYNE, IND.**

INDIANAPOLIS BOLSTER SPRING COMPANY

MANUFACTURERS OF

BOLSTER SPRINGS

... AND HARDWARE SPECIALTIES ...

The Victor Buffer takes the place of the old style Rubber Buffer.



Small size, list, 65c. each.

Large size, list, 80c. each.

For sale by the following:
Sligo Iron Store Co.,
St. Louis, Mo.
Massey Iron Co.,
Kansas City, Mo.
Fulton, Conway & Co.,
Louisville, Ky.
W. J. Holliday & Co.,
Indianapolis, Ind.
McKenzie, Flint & Wins-
by, San Diego, Cal.
Strong Hardware Co.,
Burlington, Vt.
Beck & Corbett Iron Co.,
St. Louis, Mo.

INDIANAPOLIS, INDIANA, U. S. A.

ONE-HORSE POWER
WILL RUN IT.

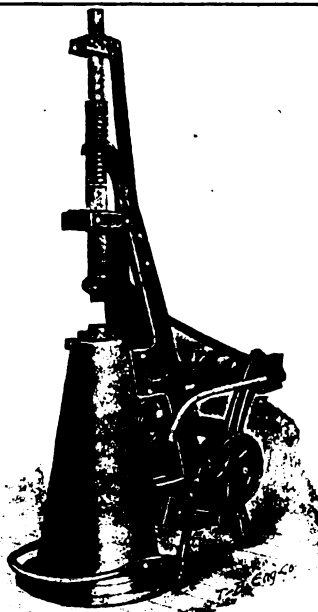
The 20th Century Power Hammer.

Powerful, durable and capable
of a large range of work. . . .

**A Labor-Saving Machine that
Should be in every Black-
smith Shop.**

The fine regulation and adjust-
ment are superior features.

The best hammer on the market for
general blacksmithing. Write for terms.



"The only hammer that can be raised
and lowered five inches instantly while in
operation, without tool or wrench. It will
strike the same blow five inches above the
die that it will directly on the die."

**It is especially adapted for plow work
and will successfully sharpen a plow lay
from heel to toe.**

Strictly guaranteed to do a wider range of
work than any other trip hammer of its size on
the market. It will successfully forge from 3/8-
inch to 3-inch round or 2 1/2-inch square iron.

The hammer head weighs 50 lbs. It may be
run slowly, or at 450 blows per minute, without
injuring the hammer, because it is perfectly
free from top-heaviness, an important point,
adding much to durability.

**The Krehbiel
Manufacturing Company,
MOUNDRIDGE, KANSAS.**

LANCASTER BLOWER

No. 401

We Build a Complete Line of Blacksmith Drills and Forges

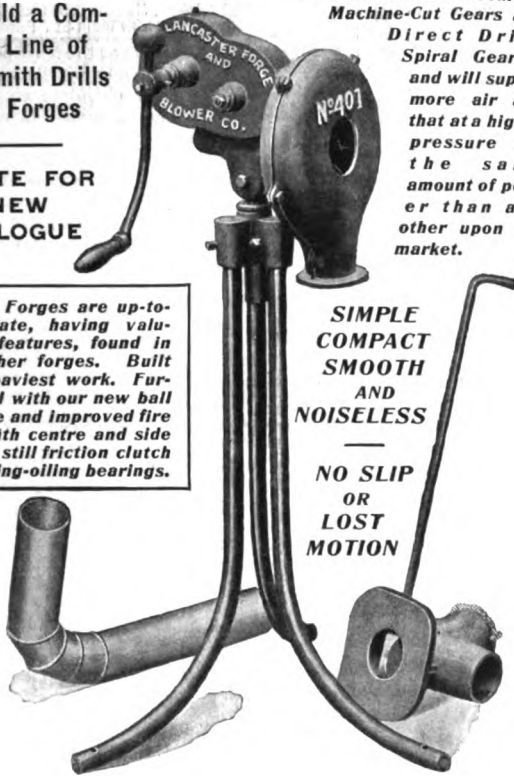
WRITE FOR NEW CATALOGUE

OUR Forges are up-to-date, having valuable features, found in no other forges. Built for heaviest work. Furnished with our new ball tuyere and improved fire pot with centre and side blast, still friction clutch and ring-oiling bearings.

This Blower has accurate Machine-Cut Gears and Direct Drive Spiral Gearing and will supply more air and that at a higher pressure for the same amount of power than any other upon the market.

SIMPLE
COMPACT
SMOOTH
AND
NOISELESS

NO SLIP
OR
LOST
MOTION



THE Ring-Oiling Bearing does away with the wasteful friction, prolongs the life of the machine, and doubles its ease of running. Our Portable Forges are the only ones on the market built with ring-oiling bearings. Our friction clutch is something new, and an immense improvement over the old style. IT CANNOT SLIP. & &



Niagara
Blacksmith
Forge
No. 250

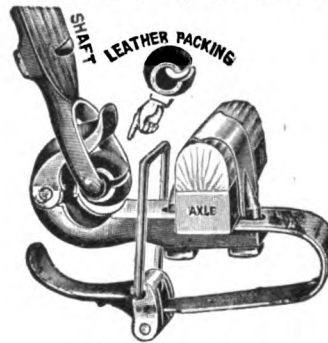
Lancaster Forge & Blower Co.

BUFFALO, N. Y.

If the life of a carriage could be measured by the life of a

BRADLEY SHAFT COUPLING

The life of such a carriage would be long indeed. The BRADLEY'S period of use-



COUPLING OPEN

fulness is equal to that of any vehicle equipped with it. The *entire wear* comes on the leather packing—the only separate part of the BRADLEY. This leather packing (see cut) can be replaced at any time. The BRADLEY is a noiseless, quick-shifting BALL BEARING coupling that, with proper care and under proper usage, will be always serviceable.

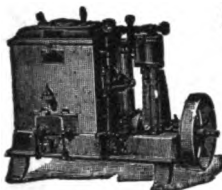
C. C. BRADLEY & SON.
Syracuse, N. Y.

LIGHTNING WELL MACHY
IS THE STANDARD
STEAM PUMPS, AIR LIFTS,
GASOLINE ENGINES
WRITE FOR CIRCULAR
THE AMERICAN WELL WORKS
AURORA, ILL. - CHICAGO - DALLAS, TEX.


METAL SHINGLE ROOFING...

With Montross Telescope Side-Lock is the best roofing in the world for house or barn. Storm proof. Easily applied. Catalogue, Prices and Testimonials free for the asking.

Montross Metal Shingle Co., Camden, N. J.

**Shipman's Steam Engine**

The safest, best and most efficient power for blacksmith and wagon shops. Refined or crude oil used. Be sure and get my prices and catalogue—free.

CHAS. W. PERCY
212 Summer St., Boston

**REISCH'S Foot Power Emery Wheels, KNIFE SHARPENERS AND TOOL GRINDERS.**

Unequaled for Durability and Speed. Write for Catalogue.

Quotations given on Solid Emery Wheels of all Sizes.

Buffalo Emery Wheel Co.
11 LOCK STREET, BUFFALO, N. Y.

"HELLO
YOU
FEL-
LERS"



If you are looking for Gas or Gasoline Engines write us for our catalogue and prices on engines before you place your order.

We will tell you something that will surprise you.
1½ to 8 H. P. 2 and 4 Cycle Engines.

BAY STATE MACHINE CO.
1211 Peach St., ERIE, PA.

While they last

We offer a few No. 9 Buffalo Forge Company's

HAND BLOWERS

at \$5.50 each, F. O. B. Buffalo. This is about

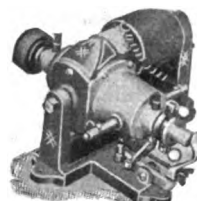
TWENTY-FIVE PER CENT. UNDER

the manufacturer's price, and should bring your order.

H. D. TAYLOR COMPANY,

101 to 109 Oak Street,

BUFFALO, N. Y.



To Owners of Gasoline Engines, Automobiles, Launches, Etc.
The **Auto-Sparker**
does away entirely with all starting and running batteries, their annoyance and expense. No bell—no switch—no batteries. Can be attached to any engine now using batteries. Fully guaranteed.
Write for descriptive catalogue.
MOTSINGER DEVICE MFG. CO.
33 Main St., Pendleton, Ind.

OUR GAS Operate at the least possible expense and your blacksmith shop is not complete without one.
ENGINES It can be started in a moment, requires no attention after starting and will not affect your insurance.



Our 3½ Vertical Straight Line Engine will be furnished complete, equipped for gas or gasoline, including hot tube igniter, starting crank, atomizer, gasoline tank, water tank, piping, and fully guaranteed.

\$115 Cash, or \$145 on Time.

LAZIER GAS ENGINE CO.

585-593 ELLICOTT SQUARE
BUFFALO, N. Y., U.S.A.

NO BLACKSMITH SHOP COMPLETE WITHOUT POWER.

No Power so

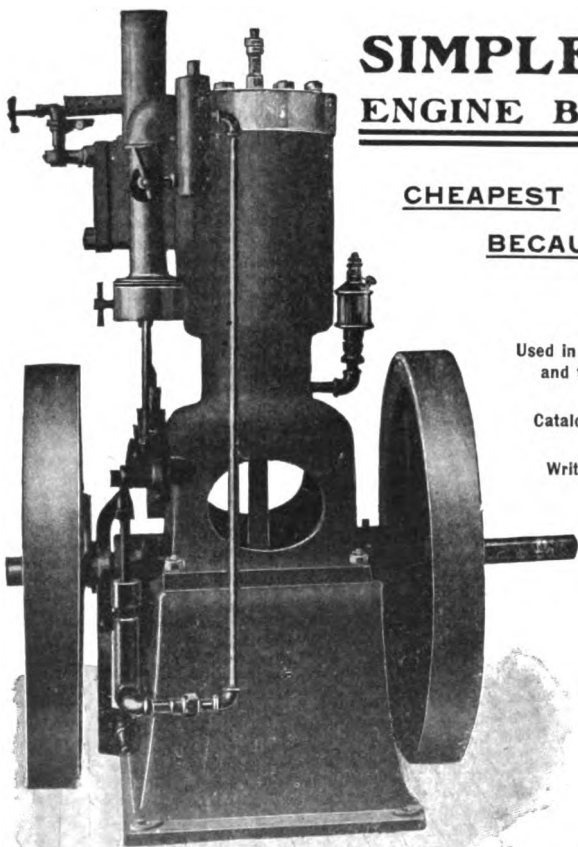
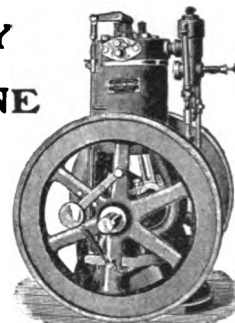
HANDY

as a Good

GASOLINE ENGINE.

Let us send you our catalogue and quote prices. Our Specialty 1½, 2½ and 4 H.P. State your power needs. If you have a Steam Engine give full description. We sometimes make exchanges.

BATES & EDMONDS MOTOR CO., - Lansing, Mich.

**SIMPLEST ENGINE BUILT**

CHEAPEST

BECAUSE

BEST

Used in every state and territory.

Catalogue free.

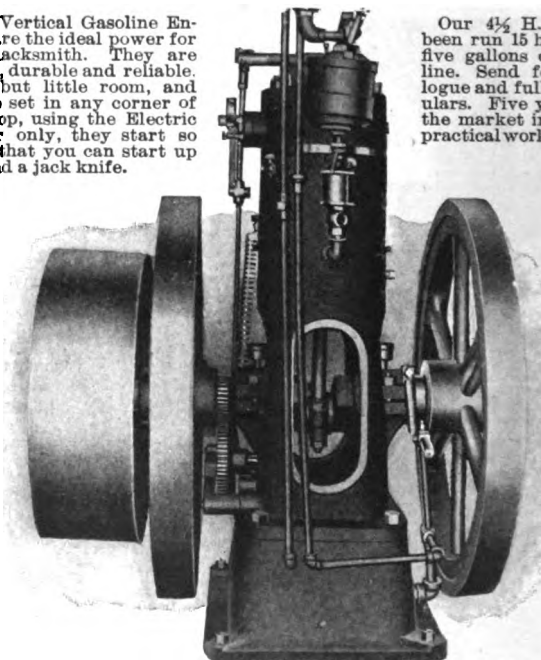
Write today.

DAVIS HORIZONTAL AND UPRIGHT **GASOLINE ENGINES**

Waterloo Motor Works, Waterloo, Iowa.

Power for Blacksmiths

Our Vertical Gasoline Engines are the ideal power for the Blacksmith. They are simple, durable and reliable. Take but little room, and can be set in any corner of the shop, using the Electric Igniter only, they start so easily that you can start up to grind a jack knife.



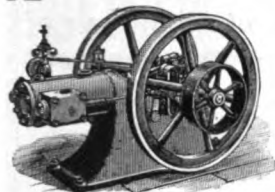
Our 4½ H. P. has been run 15 hours on five gallons of gasoline. Send for catalogue and full particulars. Five years on the market insures a practical working rig.

American Gas Engine Co.

241 Kennebec Street, Portland, Maine.

HONEST DEALINGS. Before an advertisement is accepted for this journal, careful inquiry is made concerning the standing of the house signing it. Our readers are our friends and their interests will be protected. As a constant example of our good faith in AMERICAN BLACKSMITH advertisers, we will make good to subscribers loss sustained from any who prove to be deliberate swindlers. We must be notified within a month of the transaction giving rise to complaint. This does not mean that we will concern ourselves with the settlement of petty misunderstandings between subscribers and advertisers, nor will we be responsible for losses of honorable bankrupts.

AS NEARLY PERFECT AS CAN BE MADE is what we claim for our GAS AND GASOLINE ENGINES.



These Engines are the result of twenty years' practical experience, and are unsurpassed for efficiency of operation and quality of workmanship.

OUR CATALOGUE WILL INTEREST YOU.

The FRANK M. WATKINS MFG. CO. 357 Baymiller St. CINCINNATI, O.

AT LAST! A GASOLINE ENGINE

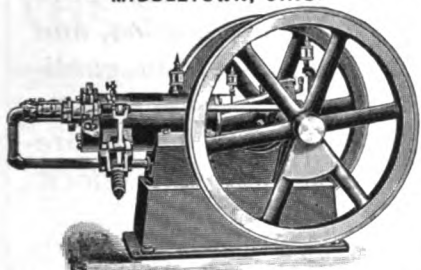
WHICH ANYONE CAN RUN AND WHICH IS EFFECTING A REVOLUTION IN THE BUSINESS.



It is the "MASTER WORKMAN." An upright engine with two cylinders. Superior to any one-cylinder engine. It has no vibration and can work on a light wagon, or can be placed anywhere. All mechanism is in full view and all parts accessible. STARTS EASIER and quicker than any one-cylinder engine. HAS MORE POWER, consumes less fuel, occupies less space. 1½, 2, 2½, 4, 5, 6, 8, 10 and 15 Horse-power. Less complicated and has fewer parts than one-cylinder engines. This is the 49th year of its manufacture, and THEIR GUARANTEE is absolutely to be relied upon. Every engine is sold on honor.

AGENTS and BUYERS WANTED. Send for catalogue. Mention this paper. THE TEMPLE PUMP CO., 15th Place, CHICAGO, U.S.A. Mfrs. of the Celebrated Diamond Windmills; also full line of Pumps, including Well Purifying Pumps.

"MIAMI" GAS AND GASOLINE ENGINES
THE MIDDLETOWN MACHINE CO.
MIDDLETOWN, OHIO.



WRITE US AND JUDGE FOR YOURSELF.

"THE BEST IS NONE TOO GOOD"

"GUS" GAS AND GASOLINE ENGINE

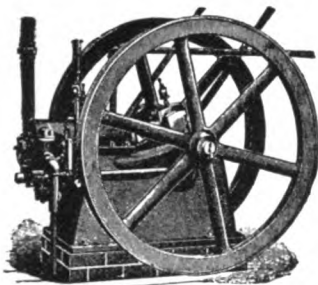
A MODEL OF PERFECTION

WRITE FOR CATALOG AND PRICES
THE CARL ANDERSON CO.
23-27 N. CLINTON ST.~CHICAGO.

"THE BULL DOG" SHAWD'S GAS AND GASOLINE ENGINES

Never let go. They have the grip on the trade. Two, four and six H. P. Liberal discount to dealers.

THE SHAWD GAS ENGINE CO.
SPRINGFIELD, OHIO.



Mention this paper when writing.

BARGAINS In Rebuilt Second-hand GASOLINE ENGINES

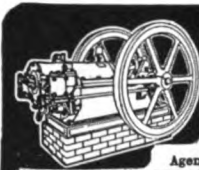
Good as New

Also New Gas and Gasoline Engines

GET MY PRICES

J. MONTGOMERY JOHNSTON

216 LAKE STREET - CHICAGO, ILL.



LAMBERT

Gas or Gasoline

Is the reliable engine. No long shut-down for repairs. Simple, economical. Easy to regulate speed. Strong guarantee. Agents wanted. Write for catalog.

D. LAMBERT GAS & GASOLINE ENGINE CO., Anderson, Ind.

PALMER

2 AND 4 CYCLE

GASOLINE ENGINES..

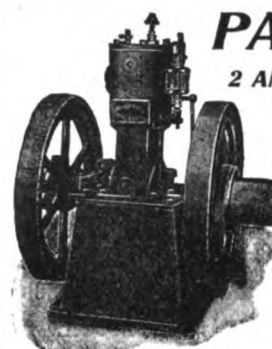
1½ to 17 H. P.

3 H. P. COMPLETE \$100.00

Send for Catalogue.

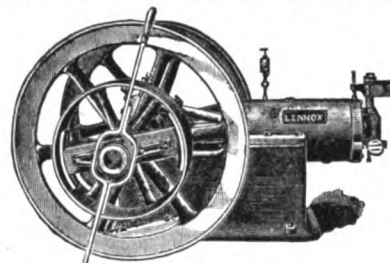
PALMER BROS.

COS COB, CONN.



Lennox Machine Co.

Manufacturers of the Lennox Stationary Gas and Gasoline Engines for General Purposes



Complete Blacksmith Power Outfits. Shafting, Hangers, Pulleys, Belting and Emery Stands.

WRITE FOR ESTIMATES

LENNOX MACHINE COMPANY

101 9th Ave., MARSHALLTOWN, IOWA

A NEW DEVICE FOR BROKEN SHAFTS

WE are now manufacturing only our new reinforced double Steel Neverbreak Shaft-Ends. We use only the best tempered steel and baking enamel, so that the finished shaft-end is remarkably free from either speck or tendency to chip or scale, making our device equal in finish to the best patent leather. Fillers are of hardwood. We guarantee every Shaft-End to be perfect in workmanship and material. They will fit any of the standard sizes of Buggy, Cart, or Surrey Shafts. Unlike all other shaft-ends, the Neverbreak can be adjusted to a broken shaft in less than five minutes; besides being a time-saving device they are also economical, being reversible, so that they can be adjusted to either right or left shaft.



THE fine gradation in weight precludes the possibility of any vibration that would tend to weaken the repaired shaft.



Special Sizes and Curves to order If Desired



Give us a TRIAL ORDER for a gross. This is a sure repeater.

Manufact'd only by NEVERBREAK SHAFT-ENDS CO., LTD., Battle Creek, Mich.

In its Fourth Year, with Over 49,000 in Use

The No. 400 Champion Steel Blowers and Steel Forges are now backed by over 49,000 of the staunchest friends the world has ever known. The fact that many of these friends are the mechanical brains of this great and prosperous nation, gives the No. 400 Blower a backing of intelligence that no other tool can boast, and we thus furnish as our best reference,

THE No. 400 BLOWER

in fact, is known not only to all the blacksmiths who have used it, but TO ALL THE JOBBERS AS THE BLOWER WHICH HAS COMPLETELY REVOLUTIONIZED THE BLACKSMITHS' FIRES OF THE WORLD. It is unquestionably the marvel of the century, and there is NO MORE COMPARISON between any other METHOD OF PRODUCING HAND BLAST and that of THE No. 400 CHAMPION, THAN BETWEEN THE OLD MAIL COACH OF THE PLAINS AND THE LIGHTNING EXPRESS OF THE PRESENT. The one is of the Past, the other, the No. 400, is of the Present. The only Blower, in brief, that can meet the high standard requirements of this intelligent age—an age that has never been equaled or even approached, in the matter of mechanical discovery, since the world began.

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U. S. Patents covering the No. 400 Steel Blower and Steel Forges granted June 11, July 30, 1901, and April 15, 1902.

Patent Numbers:
676,322 34,882
676,323 34,883
676,324 34,884
34,880 34,885
34,881 697,629

— ALSO —
Great Britain Patent No. 9,662, May 25, 1900.

as we always before have done, the great army of users of the No. 400 who are now scattered in every nook and corner of this great land; and these can in one moment tell you more of the time-saving, labor-saving, and money-making qualities of this great Blower than we could if we wrote volumes on the subject.

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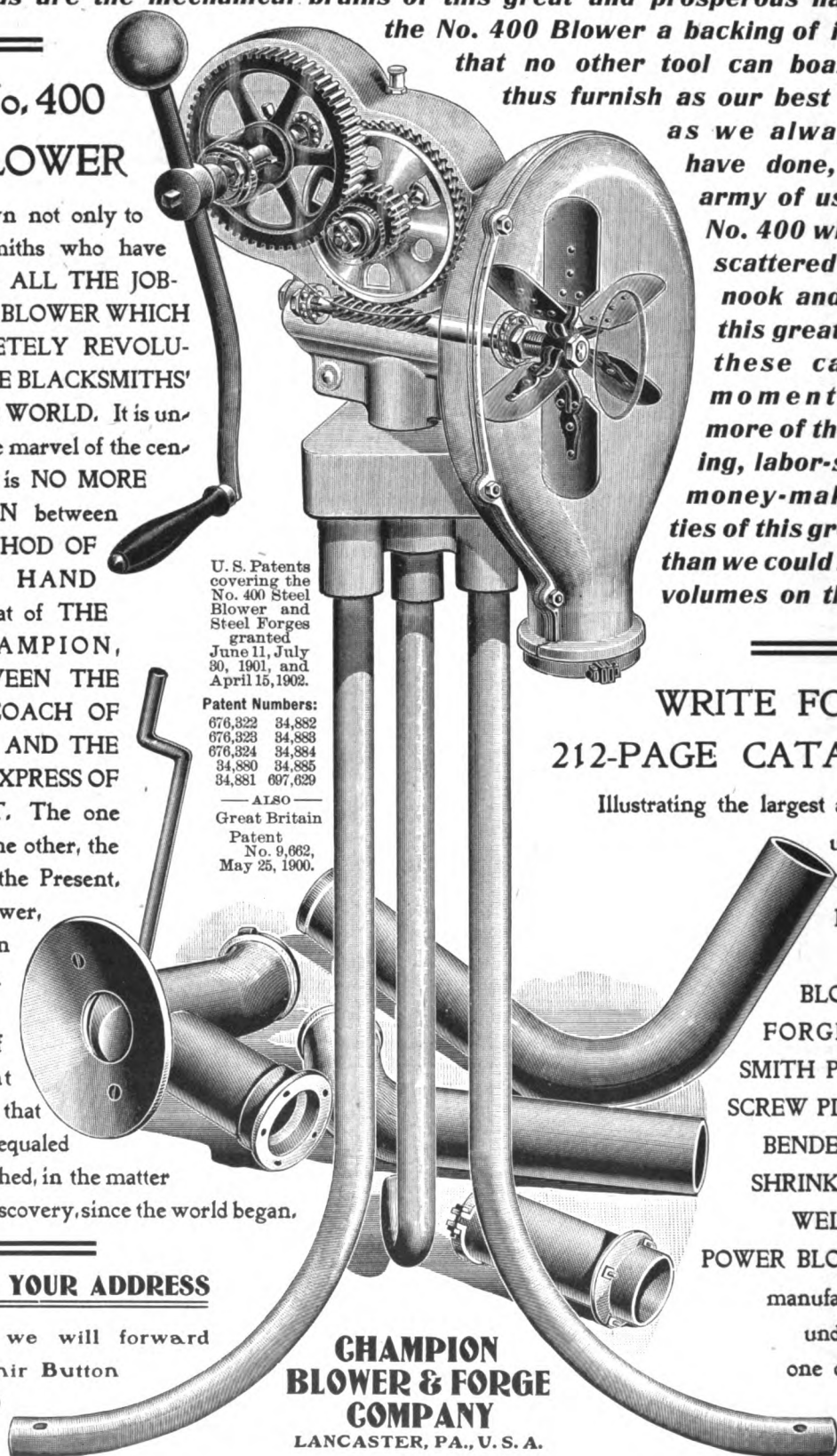
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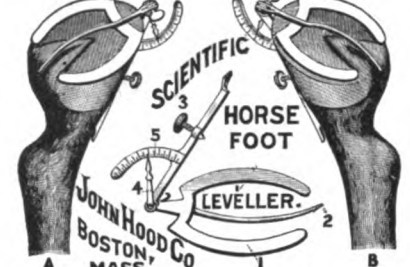
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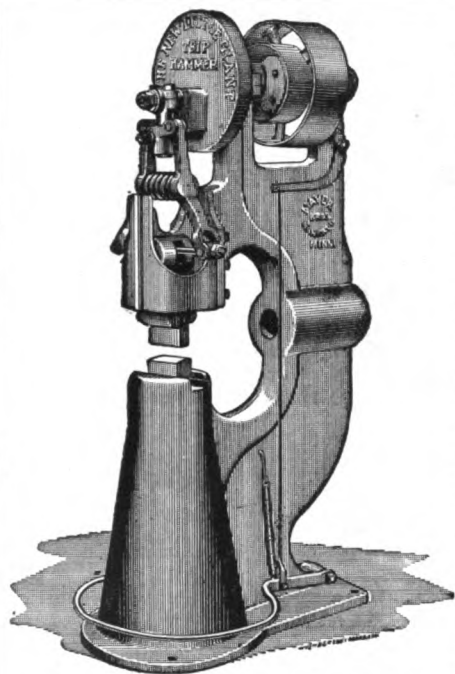
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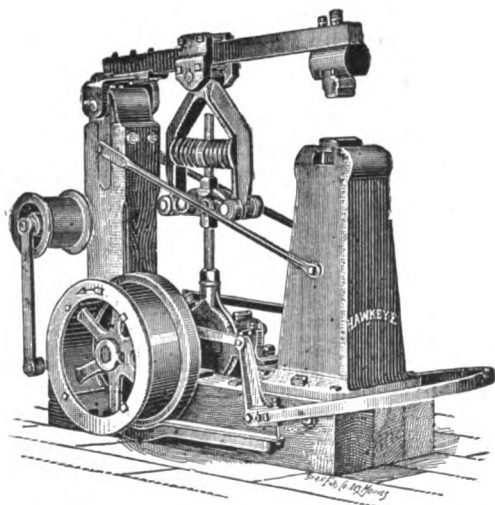
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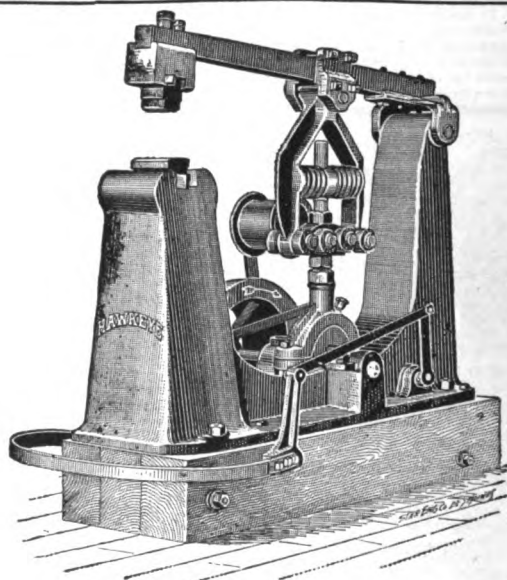
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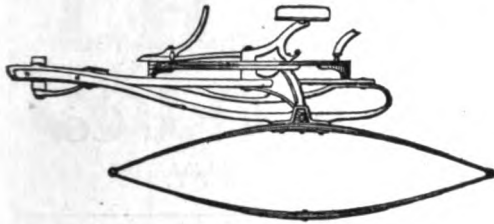
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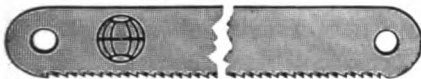
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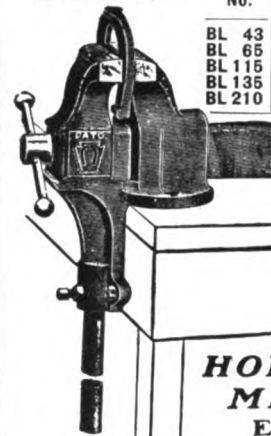
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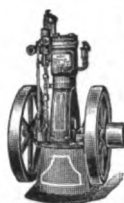
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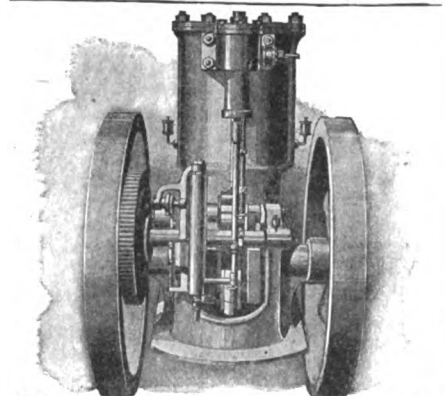
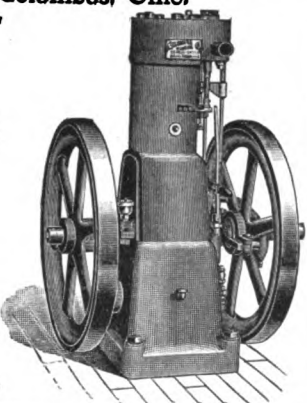
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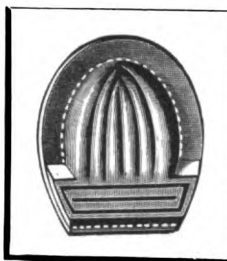
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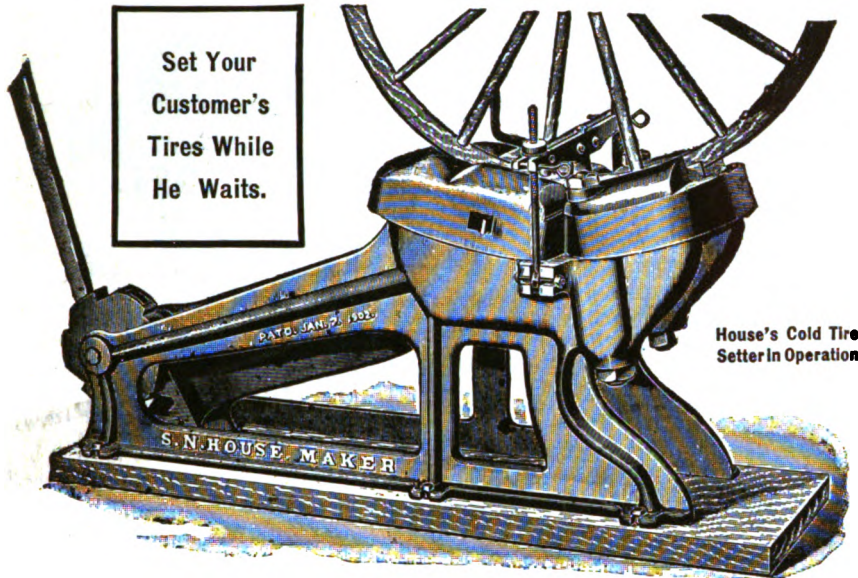
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The grip keys are eight inches long, so they cannot scar nor cup the tire. The wheel is screwed down firm against the machine so that the tire cannot kink while setting. It sets them quickly and nicely, and it is the only machine that does. It is as simple and easily operated as the hot tire setters, made on the same principle, and will last forever. It is made of steel and cannot be broken; it weighs seven hundred pounds. Write at once for descriptive circular and price, which is very reasonable.

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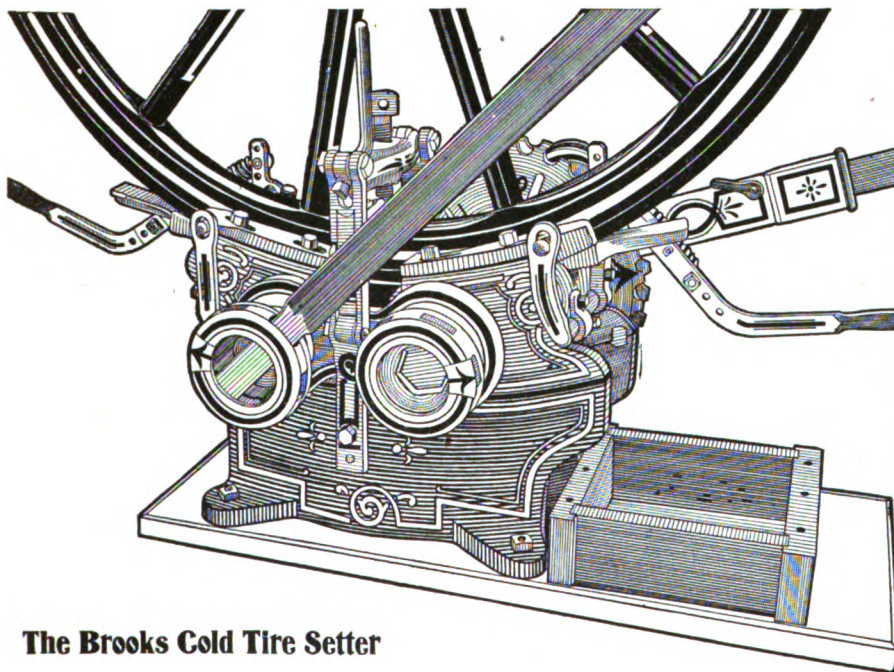
In ordinary cases I can set four tires in fifteen minutes. The machine takes up but little room in a shop and is the greatest money maker I ever saw. Every tire I have set with this machine has pleased the customers.

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If I knew as much about the "Brooks Cold Tire Setter" as I do now and did not have one would buy one to-day and wouldn't wait till to-morrow, if it cost three times the price that it does.

I think this will give you my opinion about the "Brooks."

Yours truly,
JOHN H. MIESNER.



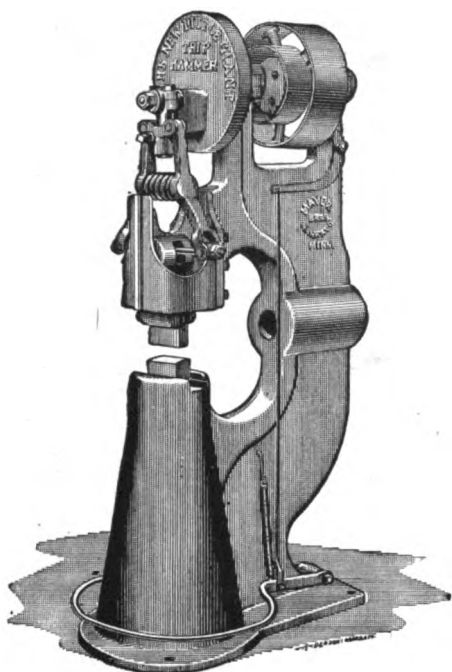
The Brooks Cold Tire Setter

sets heavy and light tires cold without removing tires or bolts from the wheels and without crushing or overdishing the wheel. A great trade drawer and money maker.

Send for our special winter terms and prices.

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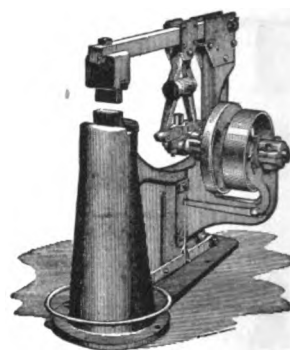
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IN ONE YEAR



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Department F, PHILADELPHIA, PA.

Please send me book and tell me upon what terms you can give me the exclusive agency

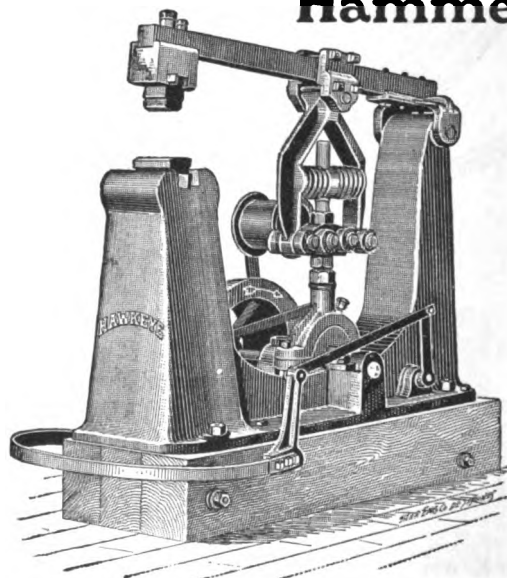
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Street

Town.....State.....

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These Hammers are built in two sizes, No. 2 and No. 8. The No. 2 is designed for plow and general repair work and gives universal satisfaction for that class of work. The No. 8 is designed for use in carriage and wagon factories, also heavy forging, and is a profitable hammer to buy, as it will do plow and light work equally as well as heavy.

Our hammers are guaranteed to give satisfaction and our prices are reasonable. For full description and prices, address,

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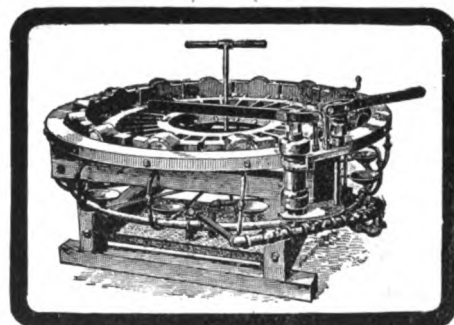
What They Think of Their "West" Tire Setter

TO THE WEST TIRE SETTER COMPANY.

NEW BEDFORD, MASS., April 15, 1903.

GENTS:—We have worked your Tire Setter for six years, and it has given us good interest on money invested, and has given entire satisfaction to every one of our customers, as it worked good on every job we have done with it. We have set tires 6 in. x 1 in., 5 in. x 1 ¼ in., 5 ½ in. x 1 in., steel tires and all smaller sizes, the first year, and which are, and have been, in use up to date every day carting rocks over good and bad roads without any sign yet of getting or being loose. We have set tires also on invalid chairs with ¾-in. round spoke, the wheels just fitting inside the ends of rams and did a very nice, good job, to the disappointment of eight spectators, who were present to see the little wheels get smashed by the big powerful machine, but "nit," as the machine has in all those six years NEVER hurt a spoke, rim or hub in any way.

The time we bought this machine we looked at the sum of money it cost as enormous (you know we have very few millionaire blacksmiths) but after sixteen months we had principal, interest and expenses back again, which is not found in every investment, besides saving a good many drops of sweat by not having to work so hard as the old way, let alone the time we saved. We don't advertise this machine in newspapers and other places, but let the machine do it by better work and less time, which counts for our customers as well.



If anyone in our section should want to see the machine work, or wants any information about it, you are at liberty to refer same to us, as we are willing to help them; we are ready and willing to live and let live. Yours,
FICHTENMAYER & FLYNN.

CAUTION.

On March 31, 1903, The West Tire Setter Company filed a bill in the United States Circuit Court, Southern District of Iowa, against the National Machine Company, of Keokuk, for infringement of the West patents. USERS of infringing machines are warned that they are equally liable with the manufacturers.

The West Tire Setter Co.
ROCHESTER, N. Y.

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Name and Address.....

Town.....

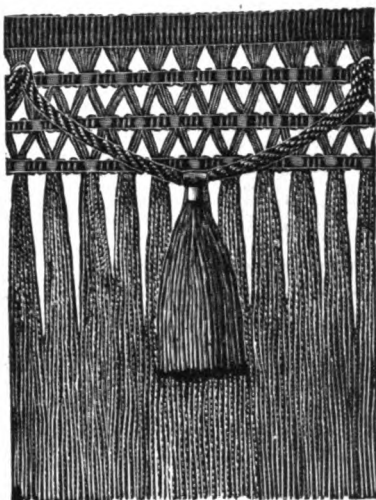
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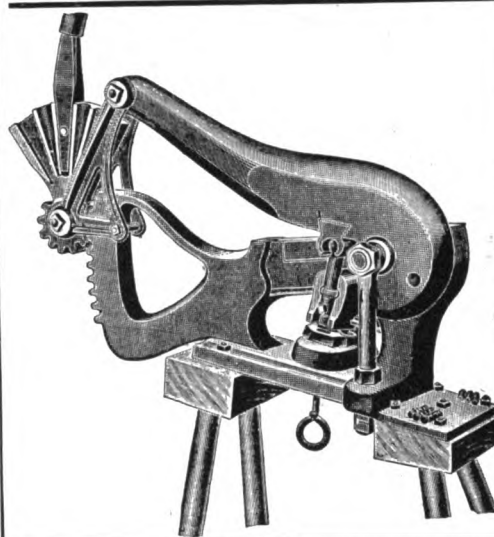
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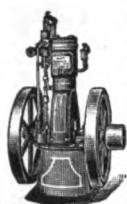
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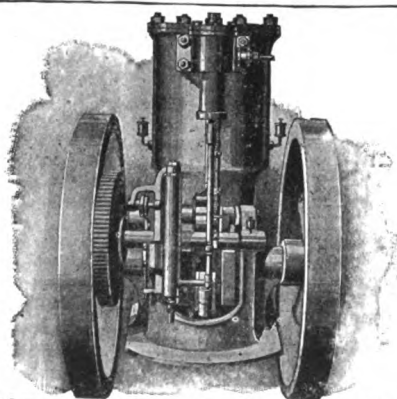
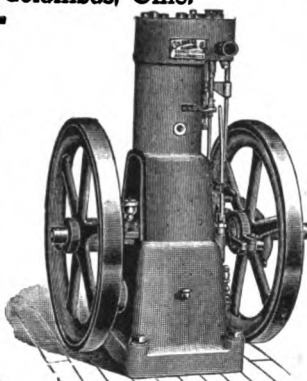
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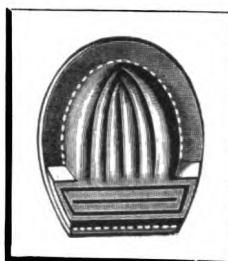
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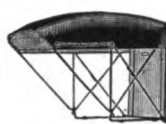
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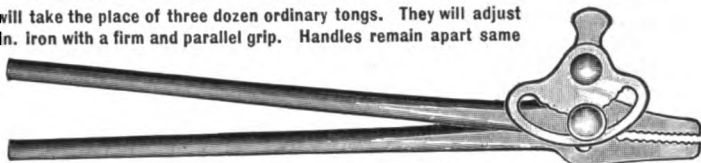
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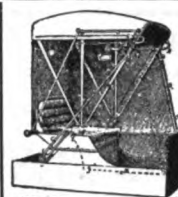
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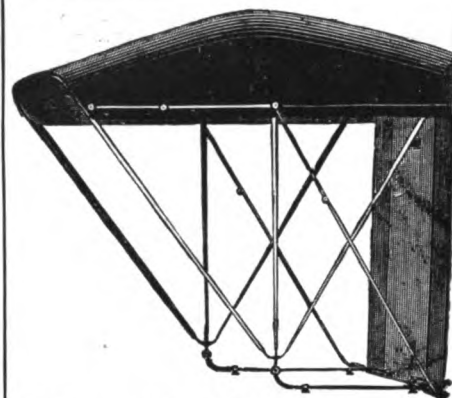
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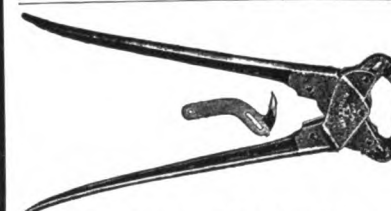
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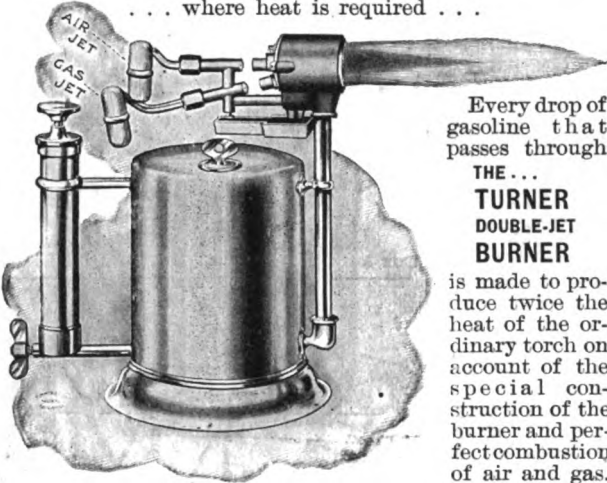
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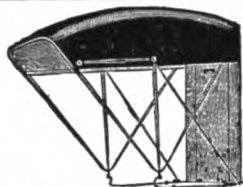
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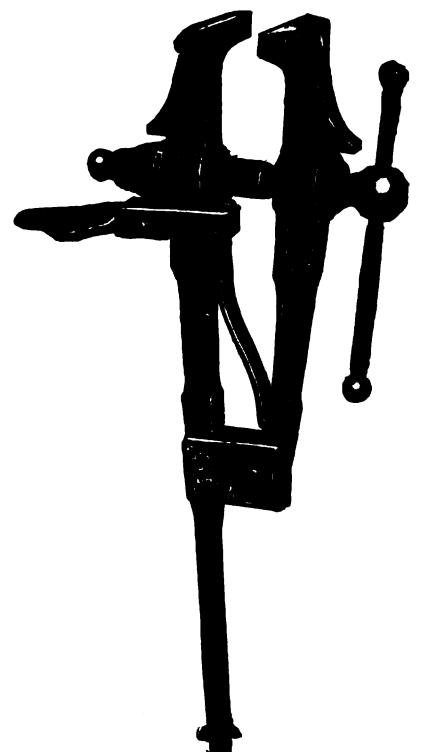
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THE AMERICAN BLACKSMITH

A PRACTICAL JOURNAL OF BLACKSMITHING.

VOLUME 2

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The Village Smithy.

The Village Smithy, mailed with our April issue, has excited any amount of favorable criticism and praise. We feel much gratified in having been able to reproduce this excellent painting for the benefit of our friends. Let us hear from you what you think about it. Copies of the picture will be sent free to all new subscribers while the edition remains unexhausted.

Foreign Subscriptions.

For the benefit of our subscribers in England, it is our desire to state that at the present time we have no subscription agent there. All subscriptions should be sent direct to us, Post Office Drawer 974, Buffalo, N. Y., U. S. A., by International Money Order. Price for English subscriptions, five shillings per year.

A New Series of Articles for the Carriage Painter.

We have been particularly fortunate in securing for our readers of the carriage painting craft a new series of articles by Mr. M. C. Hillick. Speaking of this writer, our esteemed contemporary, The Western Painter, says: "He is acknowledged to be the highest authority in America" upon all topics relating to the paint shop.

Mr. Hillick's peculiar ease and clearness of style, and his intimate knowledge of his craft and his delight in it, adds a charm to his contributions that cannot fail to awaken the interest of even the most casual readers. The present issue contains the second article of the series. The set when complete will constitute a text-book upon carriage painting that no painter can afford to be without.

A Year in Our New Quarters.

One year ago we changed our office location to the Holland Building, 451-453 Washington street, Buffalo. Our present quarters have proved extremely well adapted to our purposes, and with plenty of room and light, have facilitated the publication and distribution of the large edition of THE AMERICAN BLACKSMITH, of never less than 25,000 copies monthly. The growth of the paper, both along advertising and subscription lines, has been steady and uniform during this time. We have now to announce a great enlargement and improvement in our printing establishment, so that the printing of THE AMERICAN BLACKSMITH can now be done more quickly and to better advantage in every way. It will mean improved service for our readers. We should be pleased to have any of our friends call when in the city.

Our Blacksmith Directory.

The directory of blacksmiths in the United States and Canada, which is on file in our office, is the most complete of its kind in existence, but it is our desire to still further extend it, and we are going to ask the aid of our friends throughout the country to make our lists still fuller. We wish to secure the name and address of every blacksmith, wheelwright, horseshoer and wagon builder in this country, and to this end make the following offer as an inducement: To any one who will mail us the names and addresses of twenty-five live blacksmiths or carriage builders, doing business at the present time,

we will send a copy of our "Village Smithy" picture, charges prepaid. This is an excellent opportunity to obtain a copy, or an extra copy, of this fine picture for a very slight effort. Write the names and addresses clearly, and forward to us as soon as possible.

Subscription Prize Award.

The contest for the prize offered the person sending us the largest number of subscribers closed May 1st, and the notice of the award will be made in the June issue. The contest was a very vigorous one. Like all others of the kind conducted by THE AMERICAN BLACKSMITH, everyone who competes receives a reward, even if failing to win the first prize.

A New and Interesting Serial.

With this May number is commenced a series of articles on mechanical drawing. Each succeeding issue will contain an illustrated article on this topic until the series is completed.

In days gone by the blacksmith was able to plod along without a knowledge of drawing, for the reason that he was seldom called upon to make a forging from a drawing himself. But all this is changed. The smith who desires to keep up with the times must be able to interpret drawings, to calculate stock and to make a forging from any drawing whatever, for he never knows at what moment such knowledge may be called for.

These articles are especially compiled from the very highest authorities on mechanical drawing both theoretical and practical, and have been especially adapted for the needs of the blacksmith. The aim of the author has been to set forth in a clear, simple style, the knowledge necessary to the blacksmith upon this subject. All unpractical or unnecessary information is carefully excluded. Just a plain, matter-of-fact treatise on the elementary principles of mechanical drawing, exactly the thing our people need to enable them to make and read mechanical sketches.

While all fancy matter is left for the advanced student of drawing—the engineer, the mechanic and the professional draughtsman—this series will be found an excellent foundation upon which to start a subsequent course in mechanical drawing. Every prospective student, every engineer and mechanic, as well as the blacksmith himself, will be benefited by a close study of the present series.

A Striking Piece of Wrought Iron.

The American Eagle is a particularly obliging subject for adaptation to different decorative designs. The fact of the eagle's being our national emblem adds a dignity and an official air to a design embracing it, which strongly appeals to the patriotic American. Hence, for an ornamental piece destined to grace a public building, or a place of learning, no better subject could be chosen.

The accompanying engraving is taken from a photograph sent us by Mr. A. J. Jorss, Ornamental Iron Works, Washington, D. C., showing a very handsome wrought iron door grille, which was made by him for the Georgetown University, Georgetown, D. C. This grille is certainly a very striking and beautiful piece of ornamental iron work, and indicates some of the possibilities along such lines.

edifice from the cast-away "nigger-heads" of the surrounding farms. The shop, of course, needed furniture, so they set about making furniture, and the result was so good that the furniture-making department became permanent.

A peculiar code of rules has the Roycroft. In fact, the rules are scarcely rules at all, according to popular ideas of rules. Every worker is given the work he fancies and encouraged to cultivate his talent and skill in that particular line. At the same time he is encouraged to practice other



A STRIKING DESIGN FOR A WROUGHT IRON GRILLE.

Blacksmithing at the Roycroft.

Of the Roycrofters and Mr. Elbert Hubbard so much has recently been said, that it is scarcely necessary to go into details of introduction.

The town of East Aurora, some eighteen miles southeast of Buffalo, is remarkable for nothing in itself, but it has become widely famed as the home of this unique institution. The Roycrofters take unto themselves the credit of having transformed the place from an unkempt, ne'er-do-well country town, where hoodlumism reigned supreme, to an orderly, up-to-date spot—quite a model town in its way.

In 1895, the Roycroft establishment was founded, when Mr. Hubbard, unable to persuade an editor to publish his written ideas, decided to set up a printing plant and print them himself. So the "Philistine" was started. The little periodical gained a following of admirers, and so many volumes were returned for binding that a bindery was opened up on the premises. In due time, publishing of books was undertaken. The shop was too small, so the enthusiastic workers built them a fine

branches, in order that he may find rest in change of employment. The shop is made as thoroughly attractive as possible. An artistic atmosphere pervades the place. Flowers, art and music are on hand at every turn. Concerts, lectures and dances are held for the employes weekly, and classes in singing, painting, sculpture, literature, history and bookkeeping are given. Whether the plan has been a successful one or not, can only be surmised. In order to utilize the services of the old people who have sought employment in the shop, new branches of work have been started, such as the weaving of artistic rag mats for sale.

To the casual observer, the buildings present the appearance of a church or charitable institution, but the Roycroft is nothing of the kind. It is a large and successful money-making scheme, on the co-operative plan. The employes are helped and encouraged to yield their best—not forced, but attracted—and are given the best in return. Their wages are good and their accommodation very good.

To the outsider, the Roycroft sometimes seems like a new Utopia. But there is no place there for idlers. Earnest workers are always welcome, although home-talent is preferred and people from a distance are not encouraged to come.

A notable principle of the institution is that all the experts now employed in the shop came in untrained, receiving their training in experience, and by contact with examples of high-class work. There is just one exception to this rule, viz.: The master book-binder, Louis Kinder, is a German of great skill in his art, and trained in the Old Country.

The name "Roycroft" is of double origin. First, it comes from the name of the Roycrofts, who were printers to the King of England, between the years 1650 and 1690, and who did very excellent work of the mediæval style, followed by their namesakes. Secondly, the name signifies kingly craft or kingly work—that is, work of the highest grade, fit for a king. And this latter meaning is carried into the work in every branch. "Not the cheapest but the best" is the Roycroft motto. Their furniture is hand-made, solid, substantial and homely. Their books are hand-made, and although a little volume of Shakespeare sometimes sells for one hundred dollars, the cost, considering the materials and workmanship of the book, is small to those who can afford it.

In a plant of the kind, where some three hundred workers are employed, there are necessarily a great many running repairs, which keep a carpenter-shop and a blacksmithing department fairly busy. However, in the latter, they find time to make for sale, such articles as andirons, lamps, tree-boxes, umbrella-holders, jardinières, and other ornamental pieces. The work in this line, as in every other, savors of the antique. "Art," says Mr. Hubbard, "is the expression of the workman's pleasure in his work." Everything about the chandeliers, even to the chains, is made by hand. The finishing of the furniture is also wrought iron, as is everything made in the shop. Even the hinges on the book-cases, boxes and chests are all of different, original designs, carefully selected. The best materials are used in this, as in every department, and all but the best workmanship is discarded.

The blacksmith shop is a Gothic structure, forty feet long by twenty feet wide. The walls are two feet

thick, veneered inside with brick. A wainscoting extends four feet from the floor, which is of earth, and the upper portion of the walls is plastered. There are two forges in the shop. The blast is furnished by a blower run by a 5-horsepower engine. The equipment is very complete. The swages, for instance, range from $\frac{1}{4}$ to $3\frac{1}{4}$ inches, top and bottom. A lathe, a drill-press, and an emery-wheel, all of modern design, are also in use.

The accompanying engraving is from a photograph of the blacksmith shop. The artistic element, fostered every-

diameter. And so it is with all other work. The work must correspond with the boat, so that the range is from the small row boat to the large vessel.

Hints and Suggestions on the Proper Use of Files.—2.*

Height of Work.

Various ideas very naturally exist amongst mechanics as to the height at which the jaws of the vise should be set from the floor for use in filing. This arises largely, no doubt, from the varied nature of the work upon which the advocates of the different ideas have been accustomed to operate.

more closely scrutinize the work, but that he may be able to stand more erect.

If the work to be filed is heavy and massive, requiring great muscular effort, its surface should be below the elbow joint, as the operator stands farther from his work with his feet separated from 10 to 30 inches, one in advance of the other, and his knees somewhat bent, thus lowering his stature; besides, in this class of work, it is desirable to throw the weight of the body upon the file to make it penetrate, and thus, with a comparative fixedness of the arms, to depend largely upon the



EXTERIOR VIEW OF THE BLACKSMITH SHOP AT THE ROYCROFT.

where at the Roycroft, is dominant in this quaint, picturesque edifice. The rough, uncut boulders lend a unique effect.

Some Qualifications of the Ship Smith.

W. L. PAUL.

Ship smithing is quite different from most other smith work, requiring a man of long experience and a good designer. I have not been able to find a machine that would be practical in a ship smith shop. Everything has to be made to order, and in doing hundreds of jobs of the same nature, no two of them will be the same size. For instance, take an anchor. One man will want his made of $\frac{5}{8}$ -inch round stock, another will want his of $\frac{3}{4}$ -inch, and so on until it reaches as high as $2\frac{1}{2}$ or 3 inches in

For filing general work the top of the vise jaws should be placed so as to be level with the elbow of the workman, which will be found to range from 40 to 44 inches from the floor—therefore, 42 inches may be considered as an average height, best suited for all heights of workmen, when the vise is to be permanently fixed. This position enables the workman to get the full, free swing of his arms from the shoulder; the separate movement of the wrist and elbow should be done away with as much as possible.

If the work to be filed is small and delicate, requiring simply a movement of the arms, or of one hand and arm alone, the vise should be higher, not only in order that the workman may

momentum of the body to shove the file.

It will therefore be seen that in fixing the height of the vise the nature of the work and the stature of the operator should be considered, if it is deemed necessary to apply the principle correctly.

Grasping the File.

In using the larger files, intended to be operated by both hands, the handle should be grasped in such a manner that its end will fit into and bring up against the fleshy part of the palm below the joint of the little finger, with the thumb lying along the top of the handle in the direction of its length; the ends of the fingers pointing upwards or nearly in the direction of the operator's face.

The point of the file should be grasped by the thumb and first two

* From "File Philosophy" by courtesy of the Nicholson File Company, Providence, R. I.

To get the pitch of the arm, first make the axle stick straight and square on the bottom and front sides, and get the diameter of inside of skein at the shoulder. Draw A H parallel to bottom of axle, and $\frac{3}{8}$ -inch below the center line. From N, measure back on line A H one-half the diameter of wheel, giving point B, and then from point B measure the dish of wheel up to F.

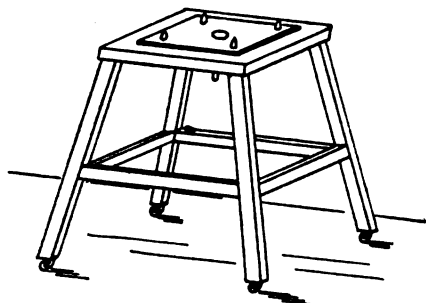


Fig. 5. BODY TRESTLE FOR THE CARRIAGE PAINT SHOP.

From F, draw the line FNM, M being the center from which to lay off size of inside diameter of skein. The inside skein diameter at the shoulder is laid off at N.

To get dish of a wheel, lay a straight edge across the face of the wheel, close to hub, and the distance from straight edge to face of spoke at the hub will be the dish, when the face of the spoke is flush with the rim. When the rim projects beyond the spoke, measure from straight edge to face of spoke at the rim, also at the hub, and the difference between them will be the dish of the wheel.

Referring to the lower figure, to get the gather draw a line through the

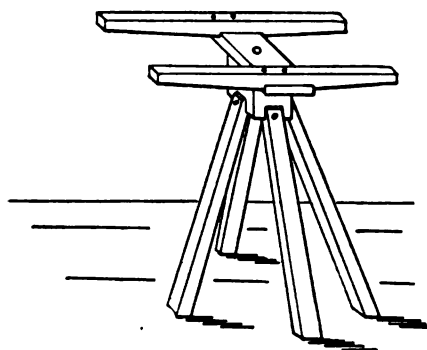


Fig. 6. COMBINATION BODY AND GEAR TRESTLE.

center of bottom as HY, and at Y measure one-fourth of an inch in front of line to get the center point of the arm, which gives the point Z. Now where BZ crosses DL is the center of the back end, from which center lay off the proper skein diameter.

A knowledge of the general construction and parts of a wheel is

indispensable to every carriage repair man, as is likewise a knowledge of how to set wagon skeins. The above is a very convenient method and with a little practice will be found quite simple.

Talks to the Jobbing Shop Painter—2.

M. C. HILLOCK.

Probably the most indispensable labor-saving device about the paint shop is the revolving body trestle, as shown in Fig. 5.

This trestle, while similar to those published in various magazines, is different in that the standards are fitted flush with the outer edge of the top frame, thus making it a stronger trestle. Height of trestle is a matter of individual preference, as are also the other dimensions. The lighter the material, without sacrificing requisite strength, the better. Fig. 6 shows a combination body and gear trestle. It is another device which the jobbing shop painter cannot afford to do without. It is made on heavier lines than that shown in Fig. 5, as it is supposed to carry the heaviest running parts, if

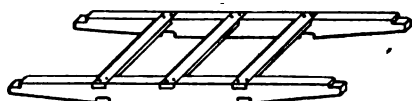


Fig. 7. GEAR FRAME TO BE USED UPON REVOLVING TRESTLE.

necessary. Make the trestle of hardwood and bolt all parts together, revolving frame pieces and standards 2 by 2 inches. Make the revolving frame 28 inches long. The bed piece supporting the frame, and to which the standards are bolted, is 5 by 5 inches and 10 inches long. As shown, the trestle is ready to handle bodies upon.

In Fig. 7 is the gear frame which fits onto the trestle, making it a revolving frame for holding carriage running parts during the process of painting, striping and varnishing. Make the frame 4 feet, 6 inches long and 14 inches wide. The illustration quite clearly explains how the frame is made. Fig. 8 shows a seat-frame made of light, 1-inch material. Make it 2 feet long, 9 inches high at rear, 2 inches at front and 13½ inches wide, to fit the revolving trestle seen in Fig. 6.

The chief advantage to be gained from the use of these revolving trestles, is that the workman is always able to command the best light the shop contains. By choosing the window affording the best and easiest light to work by, and operating the revolving trestle,

the carriage may be painted, striped, varnished, in fact, finished throughout, with no extra strain upon the nerves or eyesight.

(To be continued.)

The Elementary Principles of Mechanical Drawing.—1.

General Hints.—Instruments and Their Use.

Even the most unpretentious mechanic has, at times, occasion to make a sketch of a tool or device in his shop, or to refer to the sketches made by

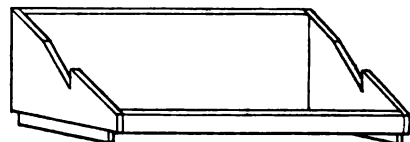


Fig. 8. A SEAT FRAME OF GREAT CONVENIENCE.

other mechanics. It is, therefore, of the utmost importance that he should know at least something of the principles of mechanical drawing. To represent a tool in such a way that he will understand it perfectly himself is very easy, although no workman-like mechanic should be satisfied with turning out crude drawings that a school-boy would scorn to own. But it is another matter to represent things in such a way that his brother mechanics may understand them as clearly as he himself does. To do this, some knowledge of the way in which it is usual to represent objects and the technical devices employed by draughtsmen is indispensable. Thus, the surfaces, intersections, elevations and depressions may be accurately represented. Each view shows something—means something. Again, in a tool composed of wood and two or three kinds of metals, the different materials may be indicated in the drawing by differently arranged lines. Colors, textures and other qualities not capable of being rendered in outline and shading may be represented in like manner. Also, cer-

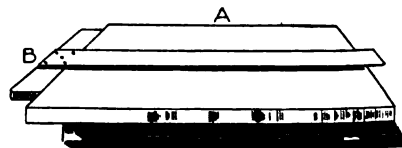


Fig. 9. A USEFUL FORM OF BOARD FOR MECHANICAL DRAWING.

tain fixed rules have been established relating to shading, perspective and other points, all of which, though seemingly trivial, serve their ends in making the drawing more intelligible.

The instruments for ordinary mechanical drawing are few and simple. The first requisite is a board of pine, or other wood, soft enough to admit of

pressing tacks into it with the fingers, and it must be of a size to accommodate the largest piece of paper which will be used. In making a drawing-board, the best way to secure the proper shape (which must be a true rectangle), is to make the two longer sides parallel, and then to mark off the ends at right

angles. Both these should be right-angled triangles, one with two angles of 45 degrees each; the other with one angle of 30 degrees and one of 60 degrees. In Fig. 2, A and B, are shown the necessary forms of triangles. These two will answer ordinary purposes. A variable curve comes next on the list,

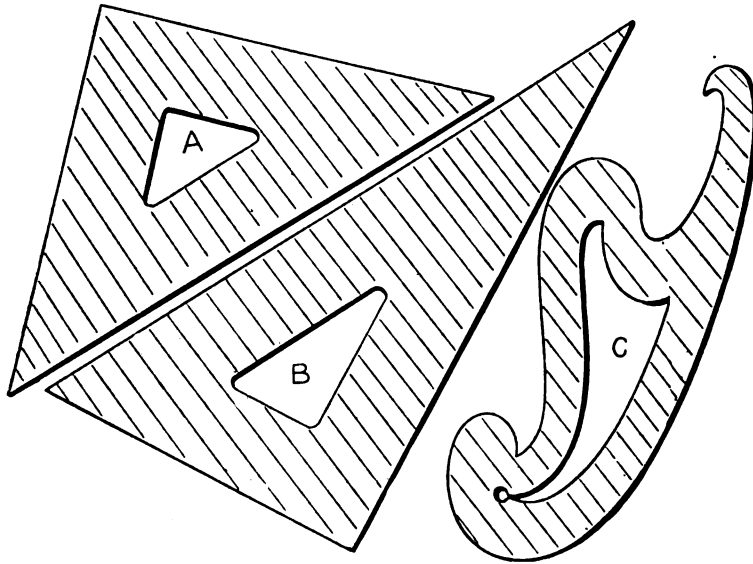


Fig. 2. TRIANGLES AND VARIABLE CURVE USED IN ELEMENTARY DRAWING.

angles by means of a square. The surface must be absolutely smooth and level. Pieces may be fastened to the bottom of the board parallel with the ends to rest it upon. They should be made short enough to insure against their protruding, should the board shrink. Fig. 1, A, shows a convenient style of drawing-board. Boards are often made with narrow side pieces at the right and left-hand sides, with their grain running at right angles to that of the board. The tacks for holding the paper in place should be small and flat, to avoid getting in the way. The paper is most conveniently placed at the left side of the board. Again it must be impressed that the board should be absolutely level, in order that the paper may lie flat.

The next thing required is a T-square (Fig. 1, B), consisting of a cross-piece with a "blade" fastened at right angles to it. The cross-piece of the T-square fits down over the edge of the board, so that the blade rests upon it at right angles without possibility of slipping or inaccuracy. Thus, parallel lines may be secured. A good scale is the next thing. There are many kinds; the triangular, which brings the numbered edge nearest to the paper to be measured, is perhaps the best. Next, a couple of triangles are needed. These may be either of wood or hard rubber.

(See Fig. 2, C). This, too, may be of wood or of hard rubber. It is used to secure free, regular lines in curves which are neither circles nor arcs of circles and hence cannot be made with compasses. A pair of compasses, like those shown in Fig. 3, B, a soft rubber and a good, hard pencil are necessary. The compasses are made so that either

the roughness be first packed down by rubbing with a clean ivory knife or pen-handle. The pencil may be sharpened either to a chisel point or a round point—the latter offers the advantage that the draughtsman can keep the point in view as the line advances and see where it is going.

For ordinary shop work, pencil drawings are the simplest and most convenient to make, but where a higher class of work is required, they must be done in ink. India ink, which does not corrode the instruments—Higgins' is good—should be used. Two special pens will be needed—a right line pen (see Fig. 3, C), and a small bow-pen (Fig. 3, A). The latter is intended for circles smaller than the compasses can well make, and is not absolutely essential. When the spring has been regulated to produce the width of line required, the pen is filled from the "filler" and held almost vertically. The lines should be drawn from left to right, or from bottom to top (away from the operator). In using the variable curve, have the line on the side of the curve farthest from the eye wherever possible, and keep the pen vertical as for straight lines.

It is an essential of ink-drawings to have the lines clean and sharp and the corners sharply defined. The whole drawing should be made first lightly in pencil complete. When the pencil draft is finished in its final form, it may be inked in. In doing this, put in all the circles and curves first, the

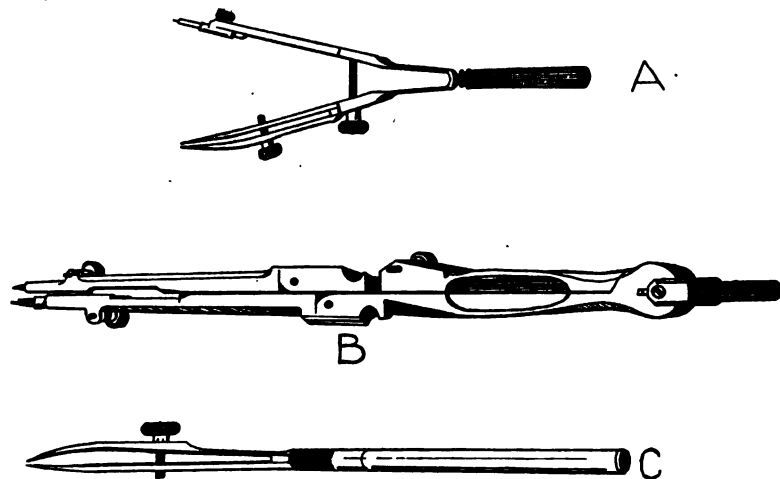


Fig. 3. ORDINARY INSTRUMENTS FOR USE IN MECHANICAL DRAWING.

a pencil or pen piece may be attached on one arm. Make the lines light and use the soft rubber in case of error, so that the surface of the paper may not be roughened in erasing, for whenever the surface is disturbed the paper is liable to become soiled. When ink is used it will run on these spots, unless

straight lines afterwards. The horizontal lines can be put in proceeding from the top of the drawing to the bottom; then the vertical lines, working from left to right. Do as little erasing as possible, and that with a sharp, hard ink eraser that will take off only the line required to be removed,

Feci.*

EDNA MANNERS.

At his forge, grim and black, toiled the smith all the day,
Where the setting sun found him still working away.
All unheeded the hour though the daylight waned fast
'Till the model he fashioned was finished at last.
Then sang the proud spirit within the smith's breast,
As he gathered his tools ere he lay down to rest:
"It is mine! I have made it, and mine was the thought;
From the dull, shapeless iron its form I have wrought."

Alone at his easel the painter stood long
From the chimes of the matins till near evensong,
And when twilight defied him his glances he cast
Where the vision of years lay translated at last.
As he fondled his tools in the deepening night
He cried out in his heart with a wond'ring delight:
"For the joy of mankind, out of chaos of naught,
From the dull senseless palette this work I have wrought."

The Creator looked down o'er a great living world,
As through space on and onward the Universe hurled—
All mingling and changing and ever the same
The races and ages they went and they came,—
A million strands woven in one mighty scheme—
A Universe finished, a work and a dream.
Then over the world passed the glad, silent Thought:
"From the void, without tools, this great work I have wrought."

*Written expressly for the May issue of THE AMERICAN BLACKSMITH.



A bright new summer season is at hand.
Ready for a busy season of wagon work?
Do you believe in craft organization and co-operation?
What has been your experience with rubber tire work? Profitable?

About time some of those backward customers were paying up.

Have the longer days brought a proportionate increase of work?

Before Investing in a new engine or tool of any kind it is wise to thoroughly sift and weigh the merits of the various makes. Remember also that first cost is not the only thing to be considered.

Now is the time to clean up the shop, make room for improvements, put in new tools.

The Editor of a paper having its readers' interests at heart always welcomes suggestions for improvement.

A favor to your brother smith—tell him the advantages of reading an up-to-date journal on blacksmithing.

Looking for new business chances and openings always, or are you letting your competitor get ahead of you?

Experience is the best teacher, said the unskilled horseshoer, after he had lamed a customer's horse. The owner did not agree.

Keep things in order. Do not waste your own and your customers' time in looking for tools that you could, with a little system, put your hands on directly.

Have you sent in a photograph of your shop? We are receiving pictures of every kind and description of establishment. Do not be left out of the contest.

The ten-cent customer of today may be the ten-dollar one of tomorrow. It pays to be attentive and painstaking on even the smallest job.

Additional blacksmith fires may shortly be installed by the International Harvester Company, Geo. L. Rice, Deering Division, Hamilton, Ontario.

The slow and steady man has been aptly compared with the short arm of the lever—goes slowly, possesses more force, accomplishes greater things.

Have you done any special piece of work or come across any new kink lately that would interest brother craftsmen? Send it in. We can use it.

Never despise a bit of information because it comes from a humble source. Remember that the first idea of the mighty steam engine came from the lid of a tea-kettle. Keep on the alert.

Think not that the boy of great bulk and weight will make the best blacksmith's apprentice. Something besides brute force is necessary to ensure a successful mechanic—brains and energy.

Now is your time to obtain a working knowledge of mechanical drawing. Our series on this subject is specially prepared from the highest authorities, to fill the requirements of the practical blacksmith.

Knowledge of the first thing to be done in case of ordinary shop accidents will sometimes save a smith, or his helpers, suffering, money and even life. Some of our large manufactories, equipped with modern machinery, provide hospital facilities and train employees for emergencies.

The practical application of cast iron began when water-power superseded manual labor for blowing the bellows. Cannon balls were first cast from molds made of gypsum. In 1705 the first cast iron pipes were used for the water service of Versailles, followed by screwed and flanged pipes.

The outside appearance of the shop is of great importance. This it is which first

impresses the customer. In building a new shop this should be borne in mind, and the design made as neat and pleasing as possible. If not building a new one, at least the old one may be kept in repair and neatly painted.

Everyday wheelwrights would probably shrink appalled from the task of constructing a coach like that built for Napoleon I. Its weight is about four tons. From the rims of the wheels to the roof of the body it is a mass of carving and gilding, and its embroidery and embossing outshines any circus chariot ever dreamed of, for gorgeousness.

The International Brotherhood of Blacksmiths have lately drawn up an "agreement" to hold between smiths and employees. One clause relates to apprentices, and states that every apprentice shall serve four years, after which he shall be rated a competent blacksmith and shall be given a letter of service from his employer. A very good system.

Odd customs prevail in different countries. A curious little horseshoe, a flat plate with raised rims, is used by the Turks. In Japan horses are backed into their stalls, the feed box being attached to the door. In China the men ride with their heels in the stirrups. In several uncivilized countries the horses are shod with leather shoes strapped on. In Naples none of the horses in public service are supplied with bits, but are guided by means of a brass band passing over the bridge of the nose. These are a few instances.

"The time is ripe for securing higher prices. I am located ten miles from the County seat in a thickly settled and well-to-do farming country with no shop nearer than seven miles, but the bad feature is that neighboring smiths will cut prices to get work, which I am willing they should have at the price they do work for. Four years ago I bought the place which was my father's stand when I was but a boy, and found the prices cut to pieces so one could not make a living. I at once raised them at the cost of half my trade but I soon got it all back. I am willing to raise again if I could get the best smiths of our County. Hence I am in favor of organization to secure better prices." So writes a good Iowa smith.

There's a reason for everything. Tom Tardy did not get his name for nothing. It suits him to a "T."

Yesterday morning, passing his shop at about a quarter to eight, we thought to drop in and exchange a few social words. A couple of horses were tied to the door, and when we came up the owner declared that Tom was not at home. He growled a bit and was just about to depart when there was a shuffling inside, the door opened a little way and Tom's head appeared in the aperture. "Wait a bit," he cried, but his would-be customer did not come back. Tom explained that the spring fever made him want to sleep late these mornings. He said he simply couldn't get up. "Well," he added, "I suppose that fellow's gone over to get Smith to shoe his horses. He must be in an awful hurry. I ain't no use fer them chaps as can't wait a minute fer nothin'."

American Association of Blacksmiths, Horseshoers and Wheelwrights.

The work of the Association is now well under way, and encouraging reports of substantial progress are many, both from counties where organizations have been perfected and from those where the work is still proceeding. The reforms thus undertaken for the craft make the movement an ambitious one, requiring time to perfect, but already scores of smiths have received much benefit from that which the Association has done.

Let it be here remarked that this Association is an independent company, incorporated under New York State Laws, empowering it to undertake certain reforms for the good of the blacksmiths and wheelwrights of this country, and also, among other things, to grant charters to local county associations. THE AMERICAN BLACKSMITH has, upon request, become the official organ of the movement, feeling in duty bound to uphold and advance any movement which will benefit the craft. Any statement that such local county associations cannot accomplish what they aim to, is absolutely disproved by the entirely successful associations, whose members are already organized under the plans of the American Association and enjoying the benefits obtained by standing together for their own interests. Organization is the order of the day, and the blacksmith feels the need of it as well as any other trade.

The Association will be glad to furnish full details of various successful county branches to interested smiths, who would like to see their own counties organized. Refer to the blank on page VI. A capable, energetic man in every county of the land will be needed to organize associations under our plans and guidance. The smiths of any county can thus form themselves into an association. Any who are interested in securing higher prices in their county and a Lien Law in their State should write to The American Association of Blacksmiths, Horseshoers and Wheelwrights, P.O. Drawer 974, Buffalo, N. Y., for plans and further details. Send us the name and address of every craftsman in your county that you know. The Association wishes to reach every live blacksmith, horseshoer and wheelwright in the country so as to awaken their interests and convince them if necessary of the need existing for co-operation among themselves.

The following complete schedule of prices just adopted and posted by the Orleans County (N. Y.) branch of the American Association may be of interest to readers. It is a minimum schedule, of course, and prices higher than listed may be charged:

HORSESHOEING.

Resetting shoes	-\$0.15
New shoes—No. 6 and under	.30
" " 7 and over	.35
Bar shoes—No. 6 and under	.50
" " 7 and over	.55

CARRIAGE REPAIRING.

Resetting tires, 1½ in. and under per set	2.00
Resetting tires, 1½-2½ in., per set	2.00
" " one wheel	.75
" " 3 in., per set	3.00
" " one wheel	1.00
" " 4 in., per set	4.00
New steel tires, ¾-7/8 x 1 in., per set	4.00
" " one tire	1.25
" " ¾-7/8 x 1¼ in., per set	4.50
" " one tire	1.25
" " 1-1½ x 1¼ in.	5.00
" " one tire	1.25
" " 1-1½ x 1½ in.	5.50
" " one tire	1.50
" " 1½ x 1½ in.	6.50
Iron wagon tires, 1½-2 x 1½ in.	7.00
" " 3 x 1½ in.	8.50
" " 3 x 2 in.	10.00
" " 3½ x 3 in.	10.00
" " 4 x 3 in.	11.00
Resetting light axles	1.00
Resetting channel, tire and rubber, per wheel	1.50
New axle stubs, ¾ to 1 in.*	6.00
" " 1 to 1½ in.*	6.50
" " 1½ in.*	7.50
Cutter shoes, ¾, 7/8, 1 in.	2.50
Heavy bob sleigh shoes	5.00
Heavy creased shoes	7.00
Welding shaft iron	.25
Shaft eyes (new), per pair	.75
Draw clips (new), per pair	.75
King bolts (light)	.75
Fifth wheels	\$1.50 and up
Neck yoke, full ironed, 3-3½ ft., 1.00	
" " 4 ft.	1.25
Double trees, complete, per set	2.00
Single tree, full ironed	.50
Reach bolt with tail nut	.25
Wagon box rods	.20

*Including setting boxes in wheels.

WOOD WORK.

New rims, 1-1½ in. and under, per wheel	1.00
One-half rim	.65
New rim, 3 in., per set	6.50
New rim, 3½ in., per set	7.00
New rim, 4 in., per set	7.50
Buggy spring bar	.75
Axle bed piece	1.00
Head block	.75
Reach straight	.50
Reach drop	1.00
Shaft, light	1.25
Cross-bar	.75
Whiffle-tree	.50
Wagon pole (lumber)	2.00
Brace for pole (lumber)	.65
Half crotch to lumber wagon	.75
1 crotch to lumber wagon	1.25
Reach to lumber wagon	1.00
Front hounds, lumber wagon	1.00
Front hounds, sway bar wagon	2.00
Sand board, 2 x 4 inches	.75
Sand board, 2-½ x 3 in.	1.00
Front bolster	1.25
Hind bolster	1.50
Bed piece to lumber axle	1.00
Buggy spokes	.20

Buggy spokes, two	-\$0.35
Buggy spokes, three or more	.15
Spokes, heavy, 2-½ and under	.25
Spokes, heavy, 4 or more	.20
Spokes, heavy, 3 in.	.30
Spokes, heavy, 3 in., 2 or more	.25
Side bar to surrey	1.25
Double heel shafts, 1½ x 2¼ in.	1.50
Lumber axle	2.50
Resetting light axle boxes, per set	1.00
Resetting lumber axle boxes	2.00
Lumber eveners	.50
Carriage pole	2.00
Lumber wagon pole and braces	2.50
Lumber whiffle-trees	.35
Cutter knees	\$1.00 and up
Bob runners	1.50
Bob rave	.75
Bob beam	1.00
Bob knees	.50
Bob roll	.75

REPAIR WORK.

Resharpening bean knives, long	1.00
" " short	.75
Resharpening harrow teeth	.02
" spring teeth, out of harrow	.05

Some Prices From Indian Territory.

R. A. DALE.

Horseshoeing, plain, with heel calks	\$1.00
Horseshoeing, plain, with toe calks	1.25
Resetting shoes, straight	.15
Plow shares, 16-inch	3.00
Plow shares, 14-inch	2.75
Plow shares, 12-inch	2.50
Sharpening	.20
Pointing	.65 to .75
Setting wagon tires, each	.50
Buggy tires, per set	3.00

The Railroad Blacksmith Shop.—7.

W. B. REID.

Steam Shovel Repair.—Continued.

The foregoing chapter applied very largely to the repair of old steam shovel teeth. Fig. 31, A, shows a worn tooth driven back to form a lap scarf, to which a small piece of flat iron is to

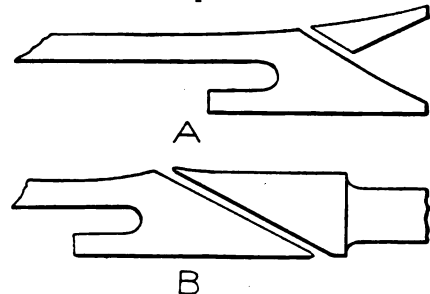


Fig. 31. REPAIR OF WORN TEETH.

be welded to form a cavity for reception of steel, similar to that shown in Fig. 28. If soft steel is to be used, the repair might with advantage be made as suggested in Fig. 31, B, in which a liberal piece of the steel is welded directly on the old part, and then drawn down to the proper shape.

The strengthening ring around the top of the dipper occasionally becomes so worn as to require renewal. Made of heavy bar iron 6" or 7" x 1½", this ring is, at best, an awkward, difficult job to handle. We have seen fairly good smiths at times sorely puzzled how to go about it, doubling the labor for themselves and helpers by failing to apply the right methods.

This ring, it will be seen (Fig. 32), is fitted at the same angle, or bevel, as the top of the dipper. This complicates operations somewhat, and is a frequent cause of much unnecessary trouble to many blacksmiths who make the mistake of bending the ring and then attempting its adjustment to necessary angles afterwards.

This can be done in a much superior and easier manner by first setting the iron to proper angles, edgewise (Fig. 33), before bending it around to the square (M, Fig. 32). The proper inclination of these angles can easily be determined by holding a straight edge

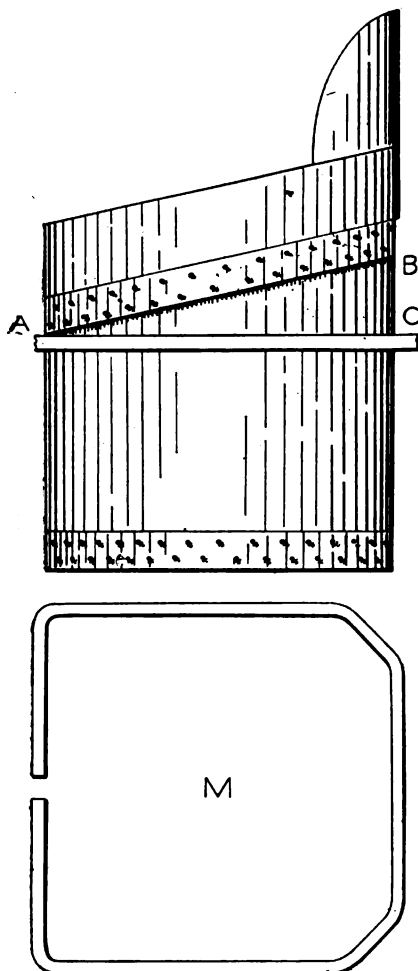


Fig. 32. FORMING AND BENDING THE RING.

along the side of the dipper (C, Fig. 32), then, adjusting a "bevel set" (E, Fig. 33), to the angle C, A, B, (Fig. 32.) Set the iron of the ring to

this angle, as shown in Fig. 33, at points A, B, C, D, corresponding to the corners of the dipper.

When first set in this way, the ring adjusts itself accurately to the shape

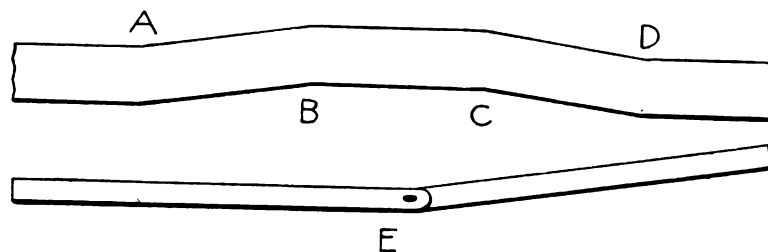


Fig. 33. METHOD FOR SETTING RING OF DIPPER AT PROPER ANGLE.

of the dipper when bent around its circumference. This latter operation can be greatly simplified by using the dipper itself as a former. For this purpose, cut eight or more pieces of 3" x 1" iron with a bolt hole in one end, as in A, Fig. 34. Bolt these clamps to the dipper in the rivet holes of the ring between, which will hold the ring tightly to the dipper while bending the corners. Bend each corner separately with a heat just long enough for the purpose. When making the two first bends allow the clamps on the sides of the dipper to hang loosely downwards, until the ring is bent around into place. Then turn the clamps up and screw the ring and the dipper closely together, as in B, Fig. 34. Repeat the same operation as each corner is bent, and a perfectly fitting ring is the result.

(To be continued.)

A Few Facts About Shoeing.

W. L. POTTER.

I believe that the shoe should correspond in heaviness to the weight of the animal, and the nature of the work which he is expected to perform. Heavy shoes not only burden the animal which is condemned to wear them, but there is truth in the old adage, "An ounce at the toe means a pound at the withers." The legitimate mission of the shoe is to prevent undue wear of the walls, and a light shoe will do this quite as well as a heavy one; it is moreover entirely erroneous to suppose that a heavy shoe wears longer than a light one, as experience has proven the contrary to be the case in many instances, even among our mammoth draft horses, whose shoes must of course be made with reference to the weight they have to bear and the strain which they are subjected to when the animal is at work. I am not prepared to admit that it is by any means necessary to add to the concussion to which the feet

are unavoidably subjected by several pounds of unyielding iron on each foot, when shoes weighing half as much would serve the purpose equally well.

The subject of winter shoeing pre-

sents in many sections of the country fresh difficulties, for now the shoe is required in the case of all classes of horses to discharge a double duty; to afford a foot-hold as well as guard against undue wear. There has been a various number of shoes invented to meet this double requirement, but the most common of them all is the old-fashioned three calked shoe, which though faulty, is probably one of the best, all things considered, to suit the various requirements. In no case should high calks be used, for a short and sharp calk will hold just as well. The horse with high calks is like a boy walking on stilts; he is uncertain of his footing, and they will rock around and are liable to strain the horse's limbs and bring untold torture to him. I believe that too many of us use too large nails and drive too many. I think a No. 6 nail will hold a shoe, No. 3, 4, or 5, as long as they ought to remain on. For No. 6 and 7, I use No. 7 nails and drive them as near the toe as possible. I have no trouble to make them stay on as long as it is advisable to let them remain. I use

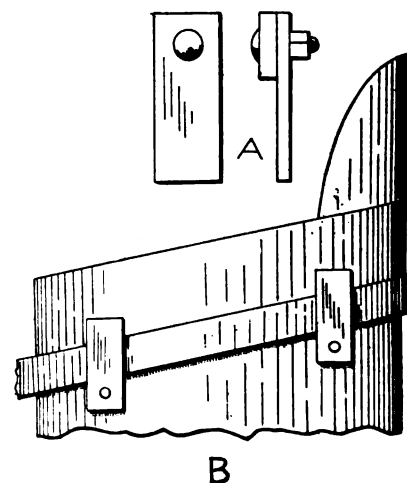


Fig. 34. FITTING THE RING TO THE DIPPER.

the Capewell nail, made by the Capewell Horse Nail Company, as I believe them to be the best and cheapest in the

end, although they cost a trifle more than some brands.

In every case the scientific principles are the same. The employment of different kinks is a matter of individual opinion.

Another Type of "The Village Smithy."

It cannot be denied that the picturesqueness of the old-fashioned shop is sacrificed to the scientific convenience of the modern one. This fact is borne out in the accompanying engraving, entitled "At The Forge." Imperfection is individuality, for, were all shops perfect, all would be alike. The primitive equipment, the patched window, the broken bricks and the smoke, all give character to the spot peculiarly in keeping with the picturesque figure of the old country smith at the forge.

This is a corner in Jeddo, N. Y., and the blacksmith is Mr. Patrick Scullion, a son of the Emerald Isle. Looking at the picture one can almost fancy the easy-going, poetic Celt has been caught off his guard, wrapt in dreams of the land of his birth, so unconscious and natural is his pose, and so full of unpremeditated action. This is quite unusual in a photograph,—the rule being stiff, half-scared figures, staring out of the picture, with fixed gaze—and places it at once in the realm of art, where few photographs are worthy a position. The photographer, Mr. Eaton, of Jeddo, deserves credit.

Mention was made, in a recent issue, of the wide variety of blacksmith shops extant. In this connection, be it noted that this also might share with Mr. Beck's picture, the title "The Village Smithy," and it is interesting to compare the two.

The Scientific Principles of Horseshoeing.—19.

E. W. PERRIN.

Closing Remarks.

In closing this series of articles on the principles of scientific horseshoeing, my first desire is to thank the Editor and management, and especially

the numerous readers of THE AMERICAN BLACKSMITH for the many words of praise and encouragement I have received.

In a final summing up of the work accomplished, it would be well to briefly review the subject dealt with in these articles. In the month of October, 1901, the first article of the series appeared in these columns, and each issue from that date, with one exception, has contained an article on some phase

pumiced foot; contraction of the hoof; thrush; ossified cartilages, or side bone, and navicular disease. But while the foregoing articles comprise the various phases, or headings, we have by no means exhausted the subject, for horseshoeing is a science that is never mastered. Some of the oldest craftsmen are frequently discovering something that they never knew before, therefore the closest observation and study is always in order. Don't let

egotism persuade you that you have learned it all. I have been a practical shoer for twenty-five years. It is over fifteen years ago that I began to write articles on shoeing, but every-day experience in my shop ever reminds me that I have not learnt it all, for I frequently discover something which I never knew before. Especially is this true in the diagnosis of foot lameness, or of balancing, interfering, etc. Hence the successful shoer must be a keen and accurate observer of the horse. He must be a close student of the anatomy of the locomotory apparatus, and of conformation, gait and action; otherwise he will not be able to discern the varying differences in the conformation of limbs—that powerful factor in the production of interfering.

The perplexing problems in interfering, balancing, etc., which present themselves to the horseshoer, are rendered the more difficult of solution because the horse does not speak, and in this particular the medical practitioner has an advantage

over the veterinary surgeon or horseshoer. A sick person can tell the doctor how he feels—can often give a history of his case,—can explain some of the symptoms, but in this particular, the veterinary surgeon and horseshoer are in the dark. They can only watch those mute signs—which it takes years of patient study to understand. They can at best treat symptoms and watch results, and by carefully noting the result of the application of certain scientific principles



AT THE FORGE.

of the subject, including elementary anatomy, and pathology of the foot; preparation of the hoof for the shoe; fitting the shoe to the hoof, versus the hoof to the shoe; care of the colt's feet and its relation to deformed limbs; frog and sole pressure; interfering front; interfering hind; cross-firing; stumbling; forging or clicking; balancing roadsters; hot and cold fitting; the use of rubber pads; pathological shoeing for corns; fracture of the hoof, toe or quarter-crack; laminitis, drop sole or

to certain defects of conformation or action, or to the treatment of disease, they hand down to the future generation of horseshoers that legacy of horse knowledge, the accumulation of research, the concretion of centuries of practical experience as a guide for the embryo horseshoer to start with. Now I would say to those who desire to make a success of horseshoeing, that the first essential is the study of the anatomy of the foot and leg. It is as necessary for the horseshoer to understand the nature of the organ he handles in his every-day practice as it is for the pharmacist to understand the nature of drugs. It is not enough that the shoer read anatomy, he must practice also. Hand and brain must work in unison. There is nothing so instructive as dissecting a dead foot and leg. Every shoer should dissect the foot and leg until he becomes intimately acquainted with every part of it, for a knowledge of anatomy is the basic principle of horseshoeing, without which the horseshoer is in the position of the quack medicine man—an imposition on the general public. There never was a period in the world's history when books and papers were so cheap as to-day, in fact, there is but little excuse for ignorance in the forge when so bright a paper as *THE AMERICAN BLACKSMITH* is within the reach of every man who works on an anvil.

This is a utilitarian age, an age of human advancement, wherein men and things are judged upon their merits. In the march of human progress there is no room for the obsolete and useless, there is no room for the shiftless drone. He who will not diligently toil to keep pace with the onward march of Twentieth Century civilization will be relegated to the background—a human derelict.

I know of no trade that has made such rapid progress during the last few years as horseshoeing. The number of journals published in the interest of the horse has fostered a very lively interest among the horse-owning public, and as a result, the horse owner is demanding a better class of workmanship than formerly, and I predict that the time is not far distant when the horseshoer, at least of cities, will be registered—

licensed practitioners—in much the same way as veterinary surgeons are to-day, and I say with all my heart—"God speed the day when the horse and its owner shall be protected from the impositions of the botch shoer."

Now in concluding this series, I believe I should miss the main point, were I to omit a few words on my pet theme—the apprentice. I have devoted much labor to the elevation of the brothers of the craft. I have watched with keen satisfaction their progress, but there is yet a great deal to accomplish. At the present time I don't believe there are fifteen per cent. of the horseshoers of America who have passed an examination in the science of horseshoeing. I do not mean that a greater percentage could not pass such an examination if they were to try, but the facilities for proper courses of instruction are poor, except in a few of the large cities, and even where the opportunity is good, the percentage of

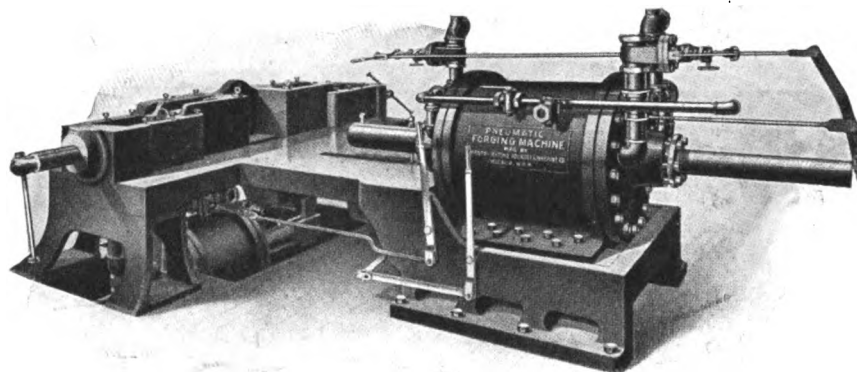


Fig. 1. THE "MECHANICAL BLACKSMITH."

horseshoers who have taken advantage of scientific instruction and obtained certificates is small. Another much-needed reform is a registration law that would protect the first class, the qualified horseshoer, the horse and its owner from the impositions of inferior workmen who are not qualified to shoe horses. But the large percentage of horseshoers who are conscious of their inability to qualify before a board of examiners makes the introduction and passage of such a law very difficult, however, I am glad to say that organization has accomplished something along this line. But since education must precede organization, the work has been slow, and after an exhaustive study of the situation, I have long since arrived at the conclusion that the hope of the trade lies in the apprentice. There has been too little attention paid to the selection of suitable material for the embryo horseshoer. The master has looked upon the apprentice as he

would upon a mule. If the boy was big and strong that was sufficient; whether he was in possession of a common school education was of secondary importance. They demanded much brawn and too little brain. This was a grave error, for it must be borne in mind that the apprentice of to-day will be the master horseshoer of the future, and the boy who has only brains enough to shovel dirt will never understand the intricate science of horseshoeing. I believe that the proper method is to compel every apprentice to go to a school of horseshoeing for a thorough course of instruction, and with this object in view, I have labored long and earnestly for the establishment of a school of scientific instruction for the proper education of the apprentice and others who may desire to attend. But although I have accomplished something along educational lines, I have achieved nothing of a practical nature, owing to the lack of interest manifested

by the master horseshoers. However, I have not abandoned the work, and I hope the near future may develop a practical plan for the proper education of the apprentice, for in him lies the future hope of our craft. Now in conclusion, I desire to say that I have an abiding hope in the future of the horse-

shoer, for there is a most earnest desire among the leading lights of the craft for a higher education. I have observed with keen satisfaction the high standard of intelligence possessed by the men who attend the national conventions as delegates from local bodies of horseshoers, and that local bodies send their best to represent them in national conventions is evidence of their appreciation of merit. This shows that deep down in the hearts of our craftsmen there is a self-respect, a conscious rectitude, a lofty ideal, a striving for a higher civilization. History proves that the trend of human events is ever in the direction of the goal of progress; then let us so shape our course that our craft may be ever in the vanguard.

(The end.)

A New Mechanical Contrivance.

The "Mechanical Blacksmith" is a new contrivance that is attracting considerable attention. It has been in use for some time in the shops of the Illinois

Central R. R., and was designed and perfected by Mr. Martin Kennedy, foreman blacksmith, and built by authority

the terrific blow it strikes has an advantage over a squeeze of the power machine, making a more perfect job.

pounds has been forged in 47 seconds, and a valve yoke forged complete in five minutes. Turn-buckles are forged and welded in two operations, smoke arch braces in one blow, while thimble eyelet for rope hoists is bent and grooved in a single operation. From one to three minutes only is required to change the dies necessary in the most complicated jobs, and in every case this can be effected before the metal in the furnace can be brought to the proper heat for working. The machine has the unique capacity of making its own tools.

Mr. Kennedy has spent much time and thought upon this machine, but the result is well worth it, for he has contrived a blacksmithing tool unequalled in simplicity, rapidity, range of application and general efficiency. It is interesting to know that the device has already been patented in the United States, Canada, England, Germany, France, Belgium, Russia and Austria. The Featherstone Foundry and Machine Company, of 348 North Halsted Street, Chicago, have arranged to manufacture and sell it.

The accompanying illustrations explain themselves. Fig. 1 shows the pneumatic forging machine complete. In Fig. 2 are seen an interesting collection of articles forged by the machine. The wide range of application,

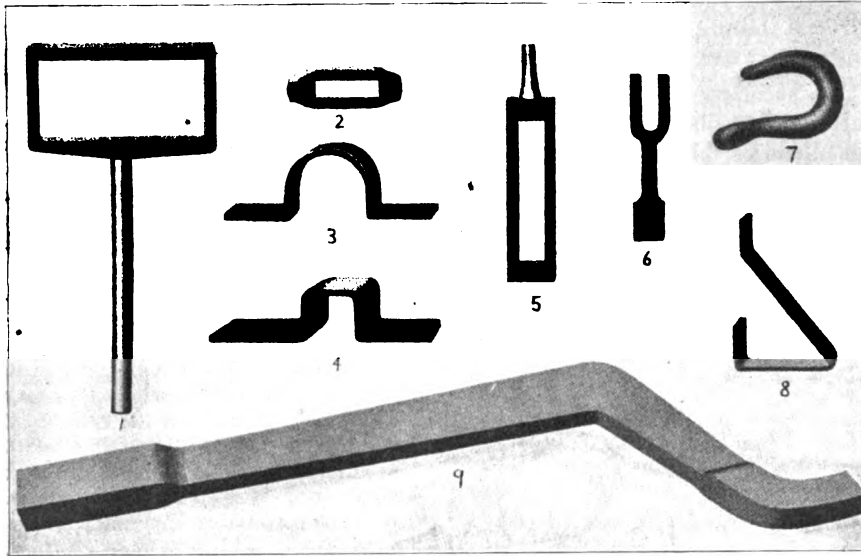


Fig. 2. ARTICLES FORGED BY THE NEW MACHINE.

- | | | |
|----------------|------------------------------------|------------------------------------|
| 1. Valve Yoke. | 4. Frame Buckle. | 7. Wrecking Chain Hook. |
| 2. Turnbuckle. | 5. Driver Brake Adjusting Rod End. | 8. Driver Brake Rod Safety Hanger. |
| 3. Pipe Clamp. | 6. Passenger Car Truck Hanger. | 9. Passenger Car Equalizer. |

of Mr. Wm. Renshaw, superintendent of machinery.

This forging machine will be of interest to every blacksmith. It is practical, economical, and its range of usefulness is very wide. It consists of a T-shaped frame, or bed-plate, and is operated by two cylinders, one plunger and one adjustable die. On the longer arm of the bed-plate is mounted the 24 by 31-inch air cylinder, the piston of which furnishes the power movement to the bulldozing plunger. On top, at either side of the shorter arms, are the die-holding forms, which can be set to open and close at any desired distance between them, and one side of which is operated by a lever connecting with the plunger of a 24 by 31-inch air cylinder below. This machine is designed for a working air pressure of 125 pounds, and some idea of its power will be gained when it is seen that it exerts a stated pressure of 57,000 pounds. The rapidity with which the blows can be struck is limited only by the speed with which a man can operate an angle-cock, as the return of the plunger is effected by means of compressed air instead of the usual spring present in other machines, while the capacity of the mechanism for turning out work is restricted only by the amount of iron that can be heated and handled for it.

It is claimed that 85 per cent. of locomotive forgings and nearly every job on a car can be turned out with the aid of this blacksmith's hammer, while

Straps, draw-bars, pockets, frame buckles, pipe clamps, valve yokes, and the like, of any dimensions, may be made from the same dies by merely applying plates to the faces of the dies of such thickness as will furnish the desired sizes. By placing liners over the face of the die in forming pipe clamps it is

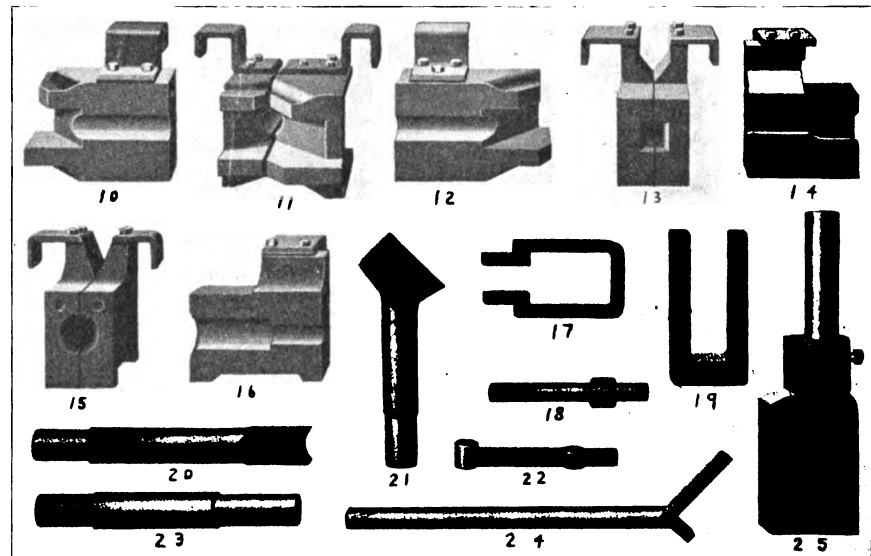


Fig. 3. SOME OF THE DIES USED IN FORGING.

- | | |
|--|--|
| 10. Die to Forge Boiler Brace. | 18. Brake Hanger Fulcrum. |
| 11. " " " " | 19. Connecting Rod Strap. |
| 12. " " " " | 20. Piston Rod Die for Passenger Car Truck Hanger. |
| 13. Die to Forge Driver Brake Adjusting Rod End. | 21. Piston Rod Die to Forge Heel on Boiler Brace. |
| 14. " " " " | 22. Driver Brake Hanger. |
| 15. Brake Hanger Fulcrum Die. | 23. Piston Rod Die for Brake Hanger Fulcrum. |
| 16. " " " " | 24. Boiler Brace. |
| 17. Draw Bar Pocket. | 25. Piston Rod Die for Connecting Rod Strap. |

possible to forge 30 to 40 different sizes of clamps in one minute, while a locomotive main-rod strap weighing 236

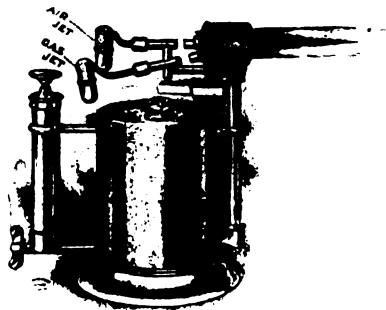
both in point of size and nature of forging, is here apparent. The dies illustrated in Fig. 3 are also very

interesting. Of course in engravings of the kind the number of parts illustrated must necessarily be limited; but those shown are typical and serve to give a general idea of the work this new machine is capable of accomplishing.

A New Double Jet Brazing Torch.

In view of the increasing use of rubber tired wheels and the consequent need for improved facilities for making and repairing them, automobile manufacturers and rubber tire workers will be interested in the Turner Double Jet Gasoline Torch herewith illustrated, in special connection with the brazing of retaining wires for solid rubber tires and work of a similar character.

The torch, but recently placed upon the market, is claimed to produce the maximum heat obtainable by a device of this kind. The intense heat is secured by a double jet burner. The air and gas are under absolute control of the operator and enter the combustion chamber separately. The independent control of the jets enables the user to mix the air and gas in exactly the right proportions to produce absolutely perfect combustion. Maximum temperatures result from perfect combustion. A temperature of 3,500 degrees Fahrenheit is claimed for this torch. To illustrate just what this means, the makers state that to flow brass a temperature of 1873 degrees is required,



A NEW DOUBLE JET BRAZING TORCH.

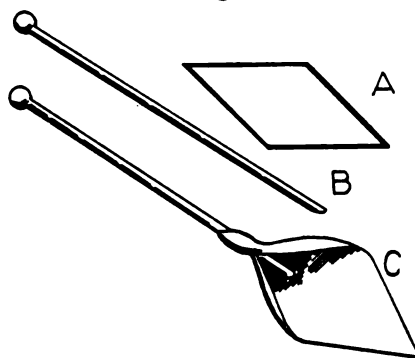
and that this cannot be successfully secured with a single jet torch. This torch produces an intensely hot and concentrated flame, and is stated to give splendid service for brazing retaining wires in rubber tires, for the use of carriage makers and for all work where intense heat is required. Mechanics and artisans have also found this torch useful for brazing, tempering and annealing, or for processes requiring a temperature higher than usual devices of this nature afford. The torch here illustrated is manufactured by The Turner Brass Works,

63 N. Franklin Street, Chicago, Ill., to whom we are indebted for the above information.

A Blacksmith's Lily.

J. P. MULBONY.

The accompanying engraving illustrates the "Blacksmith's lily," designed and used by me for a long time as a tool for the forge fire. It is indis-



THE BLACKSMITH'S LILY.

pensable for packing or poking the fire, for putting flux on heated iron or steel, for removing slag and also for many other uses about the forge. I highly recommend its use to the craft.

To make the tool, first cut out a piece of iron plate with bevel edges as at A. An old diamond-shaped cultivator shovel will do. Make the handle of $\frac{1}{2}$ -inch round iron, as shown at B, and weld the end of the diamond and the handle together, doubling the former around the end of the handle, as shown, which would shape it like the cup of a lily. The end of the handle should project one inch into the center of the cup. At C is shown the tool when complete.

The International Railway Master Boiler Makers' Association.

The above is a new Association, having been organized in St. Louis, November 12th, 1902. They will hold their First Annual Convention at the Great Southern Hotel, Columbus, Ohio, on May 19th, 20th and 21st. The following is a list of the officers for 1902-1903:

- President, F. J. Graves, Huntington, W. Va.
- 1st Vice-President, J. A. Doarnberger, Roanoke, Va.
- 2nd Vice-President, Wm. H. Laughridge, Columbus, Ohio.
- Chairman Executive Committee, Wm. P. Kelly, Dennison, Ohio.
- Secretary and Treasurer, P. Sullivan, St. Louis, Mo.
- Assistant Secretary and Treasurer, F. C. Cook, St. Louis, Mo.

List of subjects to come before the Association at this Convention is as follows:

1. Causes of fireboxes cracking; why do they crack vertically instead of horizontally? Prevention of same. M. W. MCCOY, *Chairman*.
2. Best method of setting locomotive flues; best tools for setting same; best method of caring for same while in service. C. F. WILDE, *Chairman*.
3. Best method of staying boilers and detecting defective stays. JOHN CORBETT, *Chairman*.
4. Best method of riveting seams in fireboxes. H. DENZLER, *Chairman*.
5. Best style of draft sheets and spark arrester. W. M. EVANS, *Chairman*.
6. Best method of welding flues; best fuel for same. FRANK RAHRLE, *Chairman*.
7. Construction of boiler; kind, size and tools to use. W. A. TIMMS, *Chairman*.
8. Maintenance of boilers and round house work. R. C. YOUNG, *Chairman*.
9. Best method of applying patches on fireboxes. J. J. MEYER, *Chairman*.
10. Best method of washing boilers. FLOYD HARRIS, *Chairman*.
11. Cause of mud rings leaking and the best method of preventing same. P. SULLIVAN, *Chairman*.
12. Best method of taking out fireboxes. J. A. DOARNBERGER, *Chairman*.

Tool for Removing Spokes.

J. VASTAL.

A good tool for use in taking out old spokes which are broken off at the hub is formed by welding a $\frac{5}{8}$ -inch lag screw to a piece of 15-inch iron. Then turn up the end at right angles to form a shoulder to give the hammer something to strike against in driving the spoke out. Bore a $\frac{1}{2}$ -inch hole in the tennon, screw in the tool and knock out with the hammer.



The following columns are intended for the convenience of all readers for discussions upon blacksmithing, horseshoeing, carriage building and allied topics. Questions, answers and comments are solicited and are always acceptable. For replies by mail, send stamps. Names omitted and addresses supplied upon request.

Tempering Rock Drills—Will some one kindly inform me how to temper rock drills? WM. CURRY.

Plow Work—I should like to hear from some of my brother craftsmen on how to make a new plow share, so that it will run all right. J. B. STEARNS.

A Tempering Question—I should like some good receipt for tempering thread cutting taps and dies. I lost my shop by fire last October, and my dies will be all right if they are tempered again. They were in the fire. G. W. McCORD.

Tempering Gun Springs—I find the following a very successful way of tempering gun springs. Heat to a cherry red and immerse in lard oil. Then draw the temper by dropping in lead just barely melted. Tea lead is preferred for this purpose. IRA B. HARVEY.

Steam Hammer—I work a steam hammer that is causing me a great deal of trouble. Every now and then the piston head jars loose. I hope some brother blacksmith will tell me how to overcome this trouble. CARL A. GILLEN.

A Question on Tempering Springs—How is oil prepared for tempering springs, say carriage springs, so that there is no need of drawing the temper, and what are the ingredients used in the preparation? Will somebody please state? R. F. DE PANE.

A solution which is often recommended for springs of this kind is composed of equal parts of sperm oil and neats-foot oil to which an ounce of rosin has been added. This will be found satisfactory. B. B.

Remedy for a Horse's Foot—Will some brother smith tell me the best remedy for curing a horse's foot that is decayed and brittle, and which peels off? It is hard to get a solid nail-hold, and therefore difficult to shoe. S. SHINLEDECKER.

To Shoe a Kicking Mule—If Brother C. E. McKee will hobble his mule's hind feet, he won't kick like a cow. I have shod them in most all shapes and know they can almost stand and kick a man in front of their nose if not more than fifty feet away. J. R. BOGGS.

Tempering Mill Picks—I should like a good receipt for tempering mill picks for dressing bur mill stones, as I cannot make the picks hard enough with fire and water to stand, as they want to be thoroughly hard, and yet not break. J. F. TRAMOR.

Drawing Out Spokes—I suppose Mr. Bruton knows how to draw out spokes, but when in a hurry I think the following is excellent: Turn the wheel inside up, tap the spoke with a light hammer about four inches from the hub, and nine times out of ten it will drop out. SCOTIE.

Sharpening Horse Rasps—I see that Brother J. H. L. asks about sharpening horse rasps. I grind them, starting in the middle, holding flat on the stone and turning the stone from me. It is not well to grind them too much. I grind them three or four times and then use them for plow points. C. E. BECK.

Hardening Calks—In answer to the question of Mr S Anderson about hardening calks, I would say the easiest way is to take a pail of water and put five pounds of salt in the water. Then heat the shoe red hot, cool off in the salt water, and you cannot touch it with a file, as I have found. CLAUD BAILEY.

Building Automobiles—I should like to hear from some brother who has had experience as to building an automobile which will take a load of 4000 pounds with its own weight over any kind of road. I have my own design for the carriage. I should like to know which is preferable, gas or steam? H. E. WALKER.

A Shoeing Question—I should like to hear from some of my brother craftsmen about a saddle horse that I have to shoe, which is affected in both front feet with two very bad corns. There is a core through the frog about the size of a common lead pencil that unites the corns, or what has the appearance of corns. The feet are also contracted, but not badly. How shall I shoe her to obtain the best result, and what is the cause of the core? I am anxious to find out. W. H. DOTY.

How Make a Horse Pace—I have a fine road mare five years old that is double-gaited, that is, she trots and paces. She will pace for a month at a time, and then break off and start trotting, and no matter how I shoe her, I am unable to stop her. Will some brother smith tell me how to shoe this horse so as to make her pace all the time? J. W. ERVEN.

Another Question on Shoeing—I should like to ask through these columns if there is anything in the line of shoeing that would change a colt's gait, which will be three years old this spring. He is a racker. None of the stock on either side were rackers, and I should like to get him to move on a trot while driving. I shall be much obliged for information on this subject. R. A. KELSO.

Measuring Iron for Tires—Mr. W. H. Berge wishes to know the exact amount of stock it takes for a tire. To three times the diameter add one-seventh of the diameter, and then allow the thickness of iron for weld. This will give the correct amount of stock every time. I have been at the trade for twenty years. I put on a large number of new tires every year, and I have always found this rule reliable in all my practice. S. J. BLANCHARD.

Liniment for Horse's Hoof—I should like to have some brother smith tell me which is the best liniment to apply to the hoof when it is brittle and when it crumbles away in order to preserve it in a sound condition. I shoe the mare in question with a broad web shoe with plenty of frog and sole pressure, and I think a good liniment would completely fix matters. THOMAS ROBERTS.

Tempering Gun Springs—In answer to several inquiries about tempering gun springs, the following is my method, which is simple and sure. Heat to a cherry red and harden in water. Then wipe dry and smoke with birch bark. After which heat over a clear fire until the soot burns off, and cool by swinging in the air. The spring should be forged from a good piece of cast steel, and if carefully tempered by this method, will be sure to stand any ordinary test. CHARLES J. WOLFE.

Shoeing Special Cases—For stumbling there is only one remedy, that is, cutting off the horse's hoof at the bottom of the toe. Don't put on a toe calk. If you have to put one on, put it clear on the inside of the shoe at toe and make it very low. Turn the toe up over the shoe to fit the place you have cut off of the foot, and when the foot comes in contact with the ground it will have a tendency to slip over the ground instead of stopping at once and making the horse stumble. Try it. If there is any help for him, this is the remedy.

For clicking or forging. Where a horse is continually hitting his front shoes with his hind ones, I know of only one remedy, and that is to tell the driver to drive him at a gait at which he doesn't click. A horse always clicks when he is going at a slow or moderate gait. Now tell the driver to drive a little faster or a little

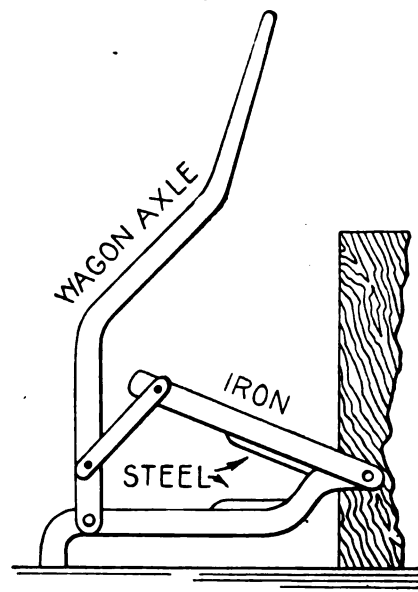
slower. Teach him a different gait, or drive him at a gait at which he doesn't click. N. T. OUTWATERS.

Sharpening Lawn Mowers—I should like to hear from some of the boys as to the best way to sharpen lawn mowers. My method is to take off the knife, dress it on the emery wheel, then replace and adjust the mower, and then reverse and grind in emery and oil. This makes a good job, but takes some time to do it. I should like to have a way of grinding the wheel, so as to do away with the emery and oil part of it. CHAS. OZIAS.

Removing Old Spokes—The following is my method of removing old spokes out of the hub when they are broken off at the hub. Take a $\frac{1}{2}$ -inch lag-screw eight inches long and a 12-inch piece of $\frac{1}{2}$ -inch iron. Then weld an 8-inch piece across the end of the 12-inch piece, which makes a T or handle. Bore a $\frac{3}{8}$ or $\frac{1}{4}$ -inch hole in the spoke, screw in your lag-screw, and use a hammer on the T. Try it and you will find it good. MAJOR B.

Shoeing Bad Horses—In noticing C. E. Gould's method of handling vicious horses, will say I would about as soon do the shoeing as to put his ropes on. I have shod broncos and mustangs as soon as they were shipped from the West, and I have never shod one with a rope on, more than a halter. I find that kindness and carefulness will go farther and be better than harness, for colts will always remember their first lesson and experience in the shop. W. L. POTTER.

A Pair of Shears—The figure accompanying this represents a pair of iron cutters which I have made. It took me about a half a day to make them, and I can recommend the same to my brother craftsmen as



A CONVENIENT PAIR OF SHEARS.

doing fine work. They only cost me about fifty cents to make. The upper movable jaw is of iron, 1 x 2 x 18 inches. The cutters are made of $\frac{1}{2}$ x 1-inch tool steel, six inches long. The link connecting the handle with the upper jaw is nine inches long, made of 1 x $\frac{3}{8}$ stock. C. E. BECK.

Shoeing an Interfering Horse—A retired horseshoer once told me that there were but two ways of shoeing an interfering horse. To pare the foot low on the outside and vice versa. The former method with a shoe straightened on the inside has been the most successful in my experience.

In case that failed, I found the other would nearly always have the desired result. In about seven cases out of ten, it is the driver's fault when his horse interferes or stumbles, but as our brother in Canada says, "The blacksmith is to correct all faulty actions, stop interfering, forging, crossfiring and a host of other defects in that line" no matter how carelessly or hard the poor beast is driven. This is all very true.
IRA B. HARVEY.

An Interesting Letter—Your letter is at hand and in reply will say that I have received two copies of THE AMERICAN BLACKSMITH. The first copy was worth the price you ask for one year, and the second copy showing the different ways of welding rocker arms was the finest explanation I have ever seen. I have seen my best days now, but if I were a young man I would not be without THE AMERICAN BLACKSMITH. I have worked now thirty-five years at the business. I have ironed lumber wagons when we had to make every iron on the wagon except the cast bolster plates. I worked on the linch pin wagon, which make is a thing of the past now-a-days. The hardest work I have ever done was shoeing, and for no money at that. PATRICK BARRY, Omaha, Neb.

Making a Printer's Chase—In the January paper, Mr. Hewitt tells how to make a chase for a job press. I shall give my way of doing it. The first thing is to have good material. Then cut a bar from five to six inches longer than wanted when done, so as to be sure to have enough to get it straight and true. Cut one end at nearly the angle of the corner when done. Suppose you want a chase 12 by 18 inches. Cut out a V-shape for the corner, then heat, and it will bend round very easily. Next weld it square and do the same with the others, thus making your chase with practically only one weld. On the inside measurement allow about half an inch on each arm, so that when welded and the corners squared-up, you will have the chase of the right dimensions. This is quickly done and makes a job that you will not be ashamed of.
I. GAUB.

Tiring a Wheel—Mr. H. W. Berge in the March issue inquired how to find the exact amount of iron to tire a wheel. The following is my method:

Take the wheel or wheels that are to be tired, and make a mark with a piece of crayon at one of the joints, and start with the mark at the end of the tire, laying the tire flat on the floor. Then rolling the wheel carefully on the tire until the starting point is reached, mark the tire and from that point add one and a half times the thickness of the tire that is going to be used. For example, if the tire is $\frac{1}{4}$ inch thick add $\frac{3}{8}$ of an inch, or if it is $\frac{3}{8}$ of an inch thick add $\frac{1}{2}$ of an inch. Always make your measurement good and long because some iron and steel tucks more than other kinds in bending. Use each wheel for its own measurement because wheels vary somewhat. J. E. MARTIN.

Tiring a Wheel—In answer to Mr. H. W. Berge in the March number asking how to find the exact amount of tire to tire a wheel, would say that the way in which I do it is as follows: Lay the new tire down on the floor and mark the felloe joint on wheel. Put the wheel on tire with mark at one end and roll the wheel over tire until the mark comes down to tire again. Then mark the tire $\frac{1}{2}$ or $\frac{3}{4}$ of an inch larger and cut off.

The next step is to bend it. If you haven't a tire bender, lay tire on floor again, put a clevis under one end and set the wheel in the clevis with pin over the

felloe. Proceed to roll the wheel and the tire, keeping the wheel from slipping as much as possible. If it be a buggy tire, one man can easily bend it, but if it is a wagon tire, it takes two.

I have a staple about four or five inches wide driven down in the sill through the floor to finish bending the ends. Of course you must run the wheel, then the tire again before you weld it, so as to be sure you have it right. WILLIAM BALDWIN.

Knife Making—I should be very much obliged to hear from a brother craftsman with regard to making butcher knives, and knife blades of any kind; how to prevent warping them when hardening, and also a good way of tempering them. Will somebody answer?
J. B. CURREN.

Tempering Knife Blades—To simply temper a knife blade, take a piece of rosin soap, heat the blade just to a red, and put it in the bar of soap, edge down. Do not melt the soap; simply cut the hot piece into it. When it is cool it will be hard enough for a razor.

Another way is to take your knife, after you have it forged and ready to temper, heat it to a cherry red all over, chalk the knife well on both sides, all over, plunge it evenly in water, cutting edge first, and hold it there until it is the same temperature as the water. Be sure to have the water lukewarm. Have a bar of iron hot. A piece of $2\frac{1}{2}$ -inch wagon tire will do. Wipe the chalk off and draw the knife slowly across the hot bar. Hold the back of the knife on the bar, and let it lean over a little, as you see the blue coming in it, and be sure to keep it moving. Draw to a medium blue, chalk again on both sides and plunge into the water. Another way is to have some damp clay. Heat the knife to a cherry red and put in the clay, but you cannot always get the right temperature with certainty.
M. M.

A Couple of Questions—There are a number of questions which I should like answered by some of my brother smiths, who have more experience than I:

About Axles—Is it proper to make the front axle longer (between collars) than the hind one, say about $\frac{1}{2}$ inch or less? Will a vehicle with axles welded that way run true, providing the axles are properly set, or should the two axles be the same length? Is it right and proper to give the front and hind axle the same pitch and gather in setting so that the vehicle will run true when loaded, providing the wheels are all right?

Horseshoes—I see that some smiths turn the heel calks square with the shoe while others allow them to slant back $\frac{1}{4}$ inch or more. Is it for the horse's comfort, or is it mere fancy whether the calk is turned square under the shoe or whether it slants back? I like the looks of the square turned calk the best myself, but I should like to hear some one else's opinion about it. I am willing to learn.
D. PEKHAT.

Removing Broken Bolt from Engine Bed—I have not seen in the paper how the gentleman was to get the broken bolts out of the engine bed. I have thought of two ways that the work could be done. First, the nut or key must be removed. If a nut, wedge the bolt so as not to turn, then remove the nut; or, if a key, they can generally be slipped out. I should think my first plan would work. Then take a short jack screw and a number of short pieces of iron that would not quite fill the hole and force the broken bolt out with them. Screw one up as far as it could be driven, then add another, until the bolt could be reached. Hitch on chain falls and pull it out. This is one way.

Another way would be to take a piece of small link chain and make three half hitches around a bar a little larger than the bolt to be drawn. Next tack them lightly with solder, drop it over the bolt, and give it a sharp pull, which would break the solder. Now draw with tackle. Perhaps neither plan would work, but when in a fix like the one in question everything must be tried to accomplish the desired purpose.
H. N. POPE.

A Few Notes on Diseases of the Horse's Foot—Some brother smiths seem to think that all shoers should be veterinarians. It may be all right, but I don't think that all the blame for so many lame and crippled horses should be laid to the shoer. I think if the owner of the horse does not take care of the horse, then the shoer can not do much with a bad foot. The whole secret in having the foot in good condition is in the care of the same from colthood up, and the horse raiser should know all about taking care of the same while the colt is growing and developing, and keep the foot pared and level so that the joints will have their equal bearing. This will make the horse carry his feet in line, and not strike each other, and also help to keep the foot sound and healthy.

Of course I must say that a great many horses' feet are ruined by poor shoeing, although there are as many ruined by the owner allowing the shoe to remain on the foot too long. Therefore, the owner and the horseshoer have to work together in order to keep the foot in a good condition.

A Foundered Horse—I have been treating a horse that was very badly foundered, for six months. This horse was taken out of the pasture, fed all the corn and oats he would eat, and then driven ten miles in the heat of the day to a heavy load. On his return he was given all the water he could drink, and then turned loose to eat all the sheaf oats he could. It was seven months after this that I got him. He could hardly walk, the soles of his front feet around the point of the frog being broken through, and the sensitive sole coming through was exposed to the ground. I shod him according to William Russell and he has improved slowly ever since. His heels are in good shape; the frog has a spongy appearance, but the proper shape and size; the sole has the right cup shape nearly to the toe, just about the natural size of the foot, whereas before it was deranged. From the quarters, is the line or portion of the old dead hoof which remains turned out and flat. What I desire is to grow the hoof in shape again and get the old dead hoof off. Will some of my brother smiths tell me how to do this?
G. CLARK.

Corns and Quarter-cracks.—I should like to give my ideas on contracted feet, quarter cracks and what are wrongly called corns. With regard to the latter, I firmly believe that they are not corns, but what shall we call them? In the first place, these so-called corns are sores or ulcers, which are ordinarily caused by contraction. You rarely see one of them in a foot that is not contracted. When the foot narrows up to such an extent that the hoof crowds the wings or sides of the pedal bone in the foot, a sore follows, although they are not always visible. The horse shows a narrowing of the foot. Next the animal stubs his toe, then steadily gets worse all the time. After a time those red spots are seen which you call corns, but you have no more right to call them corns than you have a right to call an orange a pumpkin, and further you cannot cure by burning or cutting them out. First you must remove the cause.

In regard to quarter-cracks. After a horse has had a gathering or pus in the foot and the opening takes place, and the opening is perpendicular, you have what is called a quarter-crack. You can never cure this until the cause is removed, and to do this the anatomy of the foot must be thoroughly understood. It is possible that some of the toe cracks and quarter-cracks do come from a cut or a calk. In order to remove the cause of all this trouble, you must shoe with either toe clips or thin flat shoes or else with bar shoes, so that the frog can do the work that nature intended it to do. Many horses can do a lot of hard work on the farm and on the road with no shoes at all. Mr. T. J. Lemsford is right when he says: "If you know how to shoe in one place, you know how in another," but I say if you do not know the anatomy of the foot, you do not know how to shoe the foot in any place. G. W. KENYON.

Rubber Tiring—Referring to the request of Mr. J. H. Jensen for information about applying rubber tires, it seems to me to enter upon this subject fully would require considerable space. Briefly, get the circumference of the wheel first. There must be six or eight inches allowed for compression, so that it will be necessary to get a strip of rubber about that much longer than the wheel measure. Trim the ends so that it is a trifle shorter on the bottom, which will cause the top of the ends to be closed first, makes a better joint and prevents an opening at the top. The most important part is getting the tires on tight. The best method for doing this is the screw power, which most machines for the purpose are supplied with. Each machine has all the parts required for the process and differ with every make. Some compress the rubber on both sides for closing the joint. I prefer one side. I use a No. 13 soft wire, taking four pieces about ten inches long, bending them in the middle and placing them on or around the tire where the compression is to be put. For closing the joint I use a screw attached to these wires.

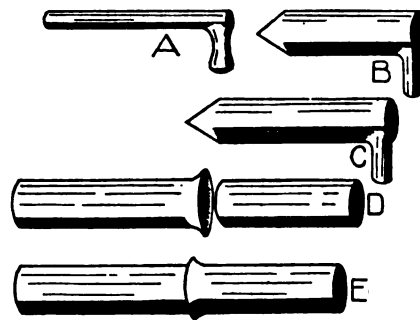
There are several methods for brazing—electricity, gas and gasoline, the latter being the best for small shops. I recommend the Turner torch, made by the Turner Brass Works, 63 North Franklin Street, Chicago, Ill. In brazing, some men use sleeves or collars, and place them so as not to come directly opposite each other, as to do so will cause a bunch and wear at that place. A lap braze is also often used. Scarf the end of the wire with a file. Care must be taken to get a neat fit, but not to get the wires too tight. If you get them too close there will not be sufficient brass between the wires to get them to hold.

I have used the West Cold Tire Setter. Not knowing what kind of machine Mr. Jensen has I cannot advise, but give the ideas as above mentioned. S. E. THOMAS.

Removing Bolts from an Engine Foundation—Referring to the problem which I gave in the December issue of THE AMERICAN BLACKSMITH for my brother smiths to think about, I will now tell how I solved it and removed the broken $2\frac{1}{4}$ -inch bolts from the foundation of the engine. The figure is printed herewith to show the foundation bolts which were broken, and which had to be removed. It was easy to remove the nut at the top part, as it had broken where it was welded by tightening the bolts on the bed-plate. The first thing that I did was to take a $\frac{1}{2}$ -inch hexagonal bar of steel and make a chisel-bar of it. With this I cut some of

the cement from around the bolts for a couple of inches. I then took a piece of $2\frac{1}{2}$ -inch pipe and flared it on the end, so that I could drive it over the bolts. After doing this I cut the pipe off level with the hole at the top of the foundation. I then took a twist drill, welded a piece to it and made the other end to fit the ratchet, as it would be impossible to drill it the way it was broken. I will tell you how I made the drill stay in the center. First I made a collar the size of the pipe inside and then drilled a hole in the collar the same size as the one that I drilled the bolts. Putting the collar on the bottom of the drill, and making one for the top so as to hold it steady, I then drilled it five or six inches deep and tapped it out to $1\frac{1}{2}$ -inches the same way as it was drilled. Next I took a $1\frac{1}{2}$ -inch thread end and made a big eye-bolt out of it, screwing the eye-bolts in the bolts which were tapped out, and fastening a 10-ton electric crane on the eye bolts, pulled them out. It took all the crane could do for they were tight, as the thread was pulled flat. GEO. GARDNER.

Welding Flues—In the January number, A. G. Ottoson asks for information regarding the welding of flues. I shall try to tell him how I have welded them successfully. He probably wants to weld a short piece to the one end. He should first make a few tools, one for scarfing,



WELDING FLUES, AND THE TOOLS USED IN THE OPERATION.

one for welding on, and a tool to use as a hammer, as he must do the welding in the fire. Having a small fire, take a short piece of $2\frac{1}{2}$ or 3-inch round iron or wood, set it upright in the fire and pack wet coal all around it tight. Then lifting the piece of iron out, he will have a small hole for his fire. After the pieces are scarfed, put them together and place in the fire. It is necessary to have good coke to feed the fire. He must keep turning his flue in the fire all the time to keep it from burning full of pin holes, using a little white sand. When it comes up to a welding heat he should take his long light hammer and tap it lightly in the fire all around the lip, going around it a couple of times. Taking it out quickly, he should slip it over the little mandrel he has on the anvil and go over with a top swage and hammer. He should have help on this, as it must be done very quickly. After he has them welded, he can put a wooden plug in the end nearest the weld and fill the flue with cold water, and if the water does not sweat through at the weld, he has got a good one that will stand 140 pounds of cold water test. I welded forty 2-inch flues a few months ago in this way for a traction engine boiler, and they all stood the test after they were put in. I shall now describe the tools.

A is a hammer made out of $\frac{3}{4}$ -inch round iron with the end bent over and the face rounded a little. It should be about thirty inches long. B is a tool to put in the

anvil hole for scarfing the flues. C is a mandrel to put in the anvil hole to slip the flue over to swage it. When bringing it out of the fire it should be small enough to allow the flue to go over it easily, as it has to be done quickly. D and E show the flue in position for welding. The rest is very simple. WM. H. KATHERMAN.

Making Plow Shares—Seeing so many different methods of how to make a new plow-share in the columns of THE AMERICAN BLACKSMITH, we shall give you our way, and let us say right here to all who will try it, they will wonder why they were so long in not making them that way before. We do not wish to criticize any one or his method, for a good mechanic can make one any of the ways enumerated, but after using nearly all these methods, we think the following the easiest and quickest:

First get an Ideal plow clamp. It is cast in a triangular shape to slip over the point of blank and landside point. It has a set screw that screws down on to the blank, likewise one from the bottom that screws up against the landside. There is a tongue cast on the inside that goes between the blank and landside point just a little ahead of the set screws, that, when tightened up, will press them together harder at the heel than elsewhere. You will find them advertised and listed in almost any catalogue.

Now supposing you have your clamp, which will not cost more than 75 cents, fit your landside point to the plow and fit it right, leaving about $\frac{3}{8}$ of an inch below the bottom of the frog and corresponding nicely with the curve of the frog on the top. You should be very careful to have the bevel on the top side, so that the blank will touch alike inside and out, or in welding it will be apt to turn over toward the side which they do not touch. Of course you must fit the back end so it will, when back against the landside plate, throw the point in exact line with the bottom of the landside proper.

Now that it is all fitted, we will clamp it to the plow by means of a clamp or pair of tongs, and proceed to fit the blank so that it lines up with the landside nicely and down on the top in good shape from the point of the heel. We always dress up the point of blank in good shape to be turned back on the underside of the point, but leaving it straight until welded to the bar. Now put your Ideal clamp on as near the point as you can and tighten up set screws, letting about $\frac{1}{4}$ or $\frac{1}{2}$ -inch of the blank project over the landside point all the way down the side. By all means have a good fire, for this is highly essential to make a weld on this class of work. We use borax and plenty of it. Plow steel will stand a high heat, provided you have plenty of borax on it. Heat slowly at back end or heel as far as your heat will reach from the corner, and we want to emphasize corner, for this is where they always break loose first. Therefore get a good clean heat on that part. Then weld with a light hammer, having a long handle, and don't strike too heavily. Be quick and hammer down along the top as far as the heat reaches. Then while it is yet hot turn the back of the share up and upset the edge (which we left out over the landside point) until it is nice and even with the landside. This upsetting raises the corner and leaves it in much better shape than when rounding, as it is so common in most lays made in country shops. Remove your clamp and continue the process until the point is reached, making sure your weld is solid as you go down, for you will be sure to get the bar out of shape if you attempt a heat back

of where you welded, on account of its expanding from hammering in the middle when both ends are solid. When welding down the top, hold the share so that it rests hardest on the edge of the anvil next to you. This will prevent the point from turning up. Turn the point back under and weld, and let it cool. Mark and drill with a little draw. If you have an emery do your grinding first. After grinding and polishing you will have a job to be proud of. H. J. DUBBS & SON.

An Interesting Letter from Canada—I am one of the oldest blacksmiths in Southern Manitoba. I commenced to work at the trade in 1855 and am still able to shoe horses, and have shod many oxen in my early days. I have had to make the shoes and the nails also, and became so expert that I could make a horseshoe in one heat ready for calking, and I could make five horse nails in one heat. You can imagine how hard we blacksmiths had to work in those days. I was healthy and strong, or else I could not have stood it. I am still working every day. I wish to give my experience on center and quarter-cracks in horses' feet. I tried clipped shoes and a bolt across to draw the foot together, but it did not prove successful. I then tried a plate fitted over the crack, fastened with fine screws, and it proved a failure also. I then tried another plan, the only one which I could make a success. This was on a center crack. Cut a groove on each side of the crack deep enough, so that you could spring the quick with the point of your knife, leaving a bar of hoof on both sides of the crack, sufficient to bear one or two stitches with soft tough wire well twisted to draw the crack together. Then cut crack across between hair and hoof with a flat bar made sharp and hot and there will be no bleeding. Weakening the wall of the foot in this way stops the spring or working of the crack and it starts at once to grow down solid. I always use an ointment of tar and grease to heal and take away the soreness. I have never failed with this treatment, and will guarantee it. I have read your journal carefully for the last year and a half, and I thought I would give you my experience on split feet, as an old timer, though I am still willing to learn. WM. J. JOHNSTON.

A Letter from Maine—I read with much interest the different opinions of men regarding smith work. Some of the kinds of work are out of my line and do not interest me much, others I criticise, and many of them I profit by.

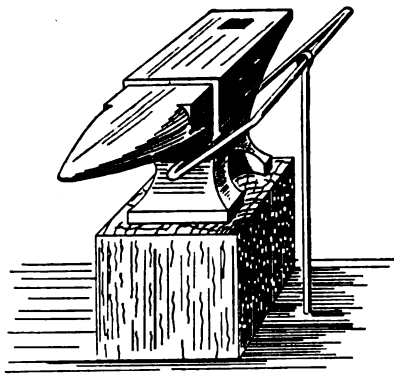
The article in the December number by W. L. G., with regard to cranky customers, was really good. I suppose most smiths have such. I think Mr. B. B. Mallory is making himself too much work, according to his writing in the February issue as to the welding of axles. I simply scarf them, take a good clean heat and put them together, using Climax Welding Compound on the scarf. A welding compound is good for nothing unless it is put between the parts to be welded (except for the borax that may be in it). I weld sleigh-shoes and carriage-springs in the same way. If any corner or lip should fail to weld, I take another heat with a little borax.

I regard toe-clips as of no use whatever, and do not use them unless urged to by customers. Side-clips are also bad, as they hold the foot too tight.

I wish to thank Mr. C. S. Simmons for his hint on tools. I have the bolt-holder and have used it for years, but did not know what to name it. I called it my "grabber," but shall adopt this new name of "LaGrippe," which is better.

Noticing the account of the folding cart body, I thought I would give my plan. I make a flat body with four stake irons on each side. I then fit my stakes to the irons, leaving them as high as I want the box. I fasten the side-board to the stakes. Putting on a rail of hardwood about two inches wide, I place cleats on the forward end, so that the end board will slip in, and have the back board held by two iron rods running through the top rail, and the sill without nuts. My wagon-body can easily be taken apart. The sills are fastened to the rocker with two bolts, and behind I have an eye bolt in the sill and a pin in the back side of the axle stock, so that to remove this box you have only to take out two bolts in the rocker, slip out the ends and sides, slide the floor back a little and it is all apart ready to pack away. I use no stakes in bolster, or rocker.

Mr. A. Bruton's device for a post drill is all right. I fixed my drill that way years ago and find it very convenient. We benefit each other by mentioning these things in THE AMERICAN BLACKSMITH. I invented a helper by putting an iron, as



AN INGENIOUS FORM OF HELPER.

shown in the illustration, on the side of the anvil. The middle piece is a brace to hold it up. Spring the ends into the holes in each end of the anvil and you will find it handy to hold up irons which are to be welded. It is easily removed and put away when not in use. WM. P. DAVIS.

Power in the Shop—A Kentucky Smith's Experience—Father was a blacksmith, and at his death had been a smith and woodworkman for about fifty years. He had four sons, of whom I was the second, and we boys had to work in the shop from the time we were big enough to stand upon a horseshoe nail box to strike. My oldest brother was very apt, and when he was seven years of age he could make a good wrought nail, and would forge the rod to make it out of by taking two half horseshoes and welding them up. He could also make a good hook and staples. At the age of eighteen he could do anything that came into our shop.

After alternating between the farm and the blacksmith shop, I settled in Christiansburg, Ky. The shops are tolerably close around here, and the shape that you can buy your material in is so nearly just what you want, that it is expensive to have an extra man. But there is some work that a man cannot do very well by himself. I had a good run of work, more on my father's reputation than my own, and I could not do it all. I could not afford to have a regular hand and could not get a good smith when I needed one, so I decided that an engine was what I needed.

I first endeavored to find out something about gasoline engines. Now, I had never run an engine of any sort, but soon

found out that machine shops would throw out gas engines and go back to steam for first one cause and then another, so I concluded to get a small steam engine. I talked the matter over with a friend who had a small engine which he let me have on trial, but the boiler had been torn to pieces. I got his engine, two by three-inch cylinder, and ordered a boiler. After getting the boiler, I found that my engine would not pull my grindstone, but would pull my blower all right. If it had been good for nothing else, and I could not have done any better, I would have fired up every day just for that much. I had an engineer come and look at it and he said the piston head had worn until it wasted more steam than it used, and it was so made that it had no cylinder ring and there could be none put on it.

Another friend then came to my rescue and told me of a second-hand engine that he thought would pull anything that I would need. This was a 2½ x 4-inch cylinder. When I put it in and fired up, I tried it on my rough machines that were home-made, and with sixty pounds pressure I could run my grindstone, drill, fire and wood lathe at one and the same time. Now I could get up steam and run all day with never more than one bushel of coal and often half a bushel—the lighter the work the less fuel. I put in a Thompson tuyere iron, so I could have as large or as small a fire as I wanted. I also put in a small emery stand, two 6-inch wheels and rigged up a band saw. At first I had some trouble, owing to my inexperience, but today I don't think there is another shop in our county with such a thing in it, and I have never had a man see it, but said it is undoubtedly the best thing he has ever seen.

Some will ask how about horses that come to be shod. I never had a horse mind the engine as much as they do the rattle or popping sound of the valves of an old bellows. I would not be without it for a good helper, if he would agree to do what it does for his board, because in the first place he could not do the work and he would cost so much more than in two years you could save and put in a new engine. If I want a light fire, I can get it and no matter how hard a blast I desire. I am able to obtain the same, and can keep it up as long as desired. If a wheel comes in, I have twenty-three different patterns for different heights and you can see the stock it saves to be able to cut your rims from timber as quickly as you can lay it off. I can rip a plow beam in five minutes or a pair of wagon hounds as quickly as a man can make up his mind to start on them. I have ground enough plow points in the last three years to pay for my coal to say nothing about what it has saved my patrons, and to say they do not appreciate this advantage would be doing them an injustice.

If you have never had an engine in your shop, it is just because you don't know the good of one and the small expense necessary to keep it up. I have only had to buy one thing and that was an emery stand. I have fitted up the rest myself, and you could do the same. No man can have an engine and not learn to use it. I could write one hundred pages and still not tell half the possibilities of power in a shop in the hands of a good blacksmith. I will say nothing about a gas or gasoline engine, for I know nothing except as stated in the first part of this letter, and you can't help but be pleased with steam. I know that it is cheaper than hand and a great deal more satisfactory. If what I have said will help any one, I am glad to be of service to my trade. N. M. SCOTFIELD.

Prices Current — Blacksmith Supplies.

The following quotations are from dealers' stock, Buffalo, N. Y., April 27, 1906, and are subject to change. No variations have occurred since last month's figures.

All prices, except on the bolts and nuts, are per hundred pounds. On bars and flats prices are in bundle lots.

Bars—Common Iron and Soft Steel.			
$\frac{1}{2}$ in., round or square; Iron,	\$3.10;	Steel,	\$2.90
$\frac{3}{4}$ in., " " " "	2.70	"	2.70
$\frac{1}{2}$ in., " " " "	2.50	"	2.40

Flats—Bar and Band.			
$\frac{1}{4}$ x 1 in., Iron,	\$2.50;	Steel,	\$2.40
$\frac{1}{4}$ x $1\frac{1}{4}$ in., " "	2.40;	"	2.40
$\frac{3}{16}$ x $1\frac{1}{4}$ in., " "	2.60;	"	2.60

Norway and Swedish Iron.			
$\frac{1}{2}$ in., round or square,	\$4.90		
$\frac{3}{4}$ in., " "	4.50		
$\frac{1}{2}$ in., " "	4.80		
$\frac{1}{4}$ x 1 in., " "	4.80		
$\frac{1}{4}$ x $1\frac{1}{4}$ in., " "	4.20		

Horseshoe Iron.			
For No. 1 shoe, $\frac{3}{4}$ x $\frac{1}{2}$ in.,	\$3.40		
For No. 2 shoe, $\frac{1}{2}$ x $\frac{3}{4}$ in.,	3.00		
For No. 3 shoe, $\frac{3}{4}$ x $\frac{3}{4}$ in.,	2.90		
For No. 4 shoe, $\frac{3}{4}$ x $\frac{3}{4}$ in.,	2.90		

Toe Oak Steel.			
$\frac{1}{2}$ x $\frac{3}{4}$ in. and larger,	\$3.50		

Spring Steel.			
$\frac{3}{8}$ to $1\frac{1}{4}$ in. Rounds, Op. Hearth	\$4.00,	Crucible	\$6.00
$1\frac{1}{4}$ to 6 in. by No. 4			
gauge to $\frac{1}{2}$ in. Flats	4.00,	"	6.00

Carriage Bolts. (Net Price per Hundred).			
$\frac{1}{2}$ x 2 in.,	\$0.54	$\frac{3}{4}$ x $2\frac{1}{2}$ in.,	\$0.82
$\frac{3}{4}$ x $2\frac{1}{2}$ in.,	.58	$\frac{1}{2}$ x $2\frac{1}{2}$ in.,	.96
$\frac{3}{4}$ x 3 in.,	.62	$\frac{3}{4}$ x 6 in.,	1.31
$\frac{1}{2}$ x 2 in.,	.66	$\frac{3}{4}$ x 4 in.,	1.70
$\frac{1}{2}$ x 3 in.,	.75	$\frac{3}{4}$ x 6 in.,	2.10

Tire Bolts. (Net Price per Hundred).			
$\frac{3}{16}$ x $1\frac{1}{4}$ in.,	\$0.18	$\frac{1}{2}$ x $1\frac{1}{4}$ in.,	\$0.28
$\frac{3}{16}$ x 2 in.,	.21	$\frac{1}{2}$ x 2 in.,	.31
$\frac{3}{16}$ x 3 in.,	.27	$\frac{1}{2}$ x 3 in.,	.37

Hot Pressed Nuts. (Blanks).			
$\frac{1}{2}$ in.,	\$0.09	lb. net	
$\frac{3}{8}$ in.,	.06	" "	
$\frac{1}{2}$ in.,	.05	" "	
$\frac{3}{4}$ in.,	.04	7-10 "	

NOTE.—Base prices for most common sizes are listed above. Should subscribers desire net prices upon other sizes than those given, same will be published in following issues.

CUMMINGS & EMERSON,
Blacksmith and Wagon Makers' Supplies,
PEORIA, ILL.

WANTED AND FOR SALE.

Want and for sale advertisements, situations and help wanted, twenty-five cents a line. Send cash with order. No insertions of less than two lines accepted.

FOR SALE—A good shop, half acre of land, six miles from the anthracite coal fields, shop 24 x 40. Write for terms.

A. L. MERITHEW, South Canaan, Wayne Co., Pa.

FOR SALE—Chance of lifetime. I must sell tools and stock on account of poor health. Best country stand in the State and best prices. One man can earn fifty dollars a week. Work for two. Address, BOX 21, Red Hook, N. Y.

FOR SALE—My shop and tools complete. Best location in Central Illinois; no competition; cause for selling—owner wishes to retire from blacksmithing. For particulars, address
T. E. LARSON, Box 45, Perdue, Ill.

WANTED—A partner who understands the wagon manufacturing business thoroughly. Must have from \$10,000 to \$20,000 to put in the business. Address,
HENRY MILLER, Calmar, Iowa.

WANTED—We invite applications from those desiring steady employment, at good wages, as first class salesmen, machinists, wood workers, blacksmiths, painters and trimmers. Experienced men in wagon and carriage manufacturing. Address,
STUDEBAKER BROS. MFG. CO., South Bend, Ind.

FOR SALE—Cheap. New treatise on Steel, Welding and Forging all the new steels, and welding compounds for same. Also Thermite welding explained, with seventy-five new steel working methods and recipes. Also two-colored scientific Tool Tempering Charts, A and B. All the above for one dollar. Samples free. Anyone having bought my recipes can have the new treatise for 25 cents in stamps.

W. M. TOY, Sidney, Ohio.

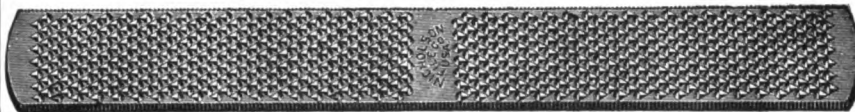
BUSINESS OPPORTUNITY—A rare chance to engage in a general Blacksmith, Carriage and Jobbing Business, including a line of carriage wood and material kept in stock for sale. The business may be enlarged or contracted to suit purchaser, as may be desired. Established by me fifty years ago. In one of the most desirable and central stands. Terms will be made very liberal if desired, by small monthly payments in addition to rent. Stock and tools at a discount from appraisal.

G. J. GREENLEAF, Portsmouth, N. H.

NICHOLSON FILE COMPANY

PROVIDENCE, R. I., U. S. A.,

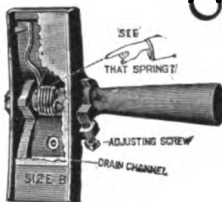
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**FILES AND RASPS**

Blacksmiths Recommend our Rasps.

BECAUSE

Their Wearing Qualities Have Been Proven.



Over 20,000 Sets Sold **AND MERIT SOLD THEM**

"SPRING" BRAKE BLOCKS

For Carriages, Wagons and Trucks

12 Sizes for Tires from $\frac{3}{8}$ in. to 5 in. wide. Wear shoes fitting these blocks adapted to either Steel or Rubber Tires.

MORGAN POTTER, Sole Manufacturer,

Catalogues and Prices cheerfully furnished.

FISHKILL-ON-HUDSON, N. Y., U. S. A.

LANG'S TIRE BOLT WRENCHES

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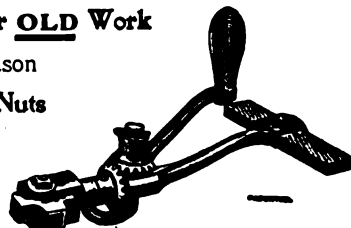
The most **CONVENIENT** Wrench for **NEW** or **OLD** Work

Will save its cost many times in one season

Will put on or take off **QUICKLY** $\frac{1}{2}$, $\frac{3}{4}$ and $1\frac{1}{2}$ Nuts

For sale by all Heavy Hardware Jobbers, or will be sent to any part of U. S. prepaid for

\$1.25



Miller Wrench Co., Fort Wayne, Ind.

No. 112 Drills

Fitting Silver & Deming's and Prentice Blacksmiths' Drill Presses. Nos. 1 and 2, with Shanks $\frac{1}{4}$ inch Diameter.

All Drills 7-32 inch and larger are 6 inches entire length.



MAKERS OF

INCREASE TWIST AND CONSTANT ANGLE DRILLS, REAMERS, CHUCKS, MILLING CUTTERS, MANDRELS, TAPER PINS, GAUGES, COUNTERBORES, MILLS, SCREW PLATES, TAPS, DIES, SOCKETS, SLEEVES, and Special Tools.

Write for Catalogue.

Morse Twist Drill & Machine Co.,

NEW BEDFORD, MASS.
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SPECIAL

THE edition of "The Village Smithy" is limited. While they last we make the following special offer—

For \$1.00 we will send—

**The American Blacksmith for one year,
A Copy of "The Village Smithy,"
and
A Premium—A Hoof Knife or a Pocket Level.**

THIS is to induce Blacksmiths, Horseshoers and Wheelwrights, who do not know THE AMERICAN BLACKSMITH, to become acquainted with the paper and read it regularly

DO NOT MISS

"The Village Smithy"

IT IS a beautiful and faithful reproduction in twelve colors of a valuable picture painted expressly for us by Raphael Beck. A handsome picture for framing. If not a subscriber, take advantage of the above liberal offer while it lasts. Send \$1.00 now so you won't miss "The Village Smithy."

And You Get Your Choice of Two Premiums—

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NOTE.—Send us two new subscribers and get a serviceable gold fountain pen as a premium. Include your own name as one if not already a subscriber.

A copy of THE VILLAGE SMITHY, carefully packed in a pasteboard tube, will be sent prepaid to any address, together with a sample copy of THE AMERICAN BLACKSMITH, for 25 cents

You Will Find that THE AMERICAN BLACKSMITH itself is the **biggest dollar's worth** that goes into your shop. **Twenty pages of solid reading matter guaranteed** each month from the brightest writers of the craft. No trade puffs or stale clippings. Read on page 151, what we are doing for the craft. We are going to get 30,000 subscribers this year—will you be one of them?

WHEN sending subscriptions, state premium desired. Send money by Registered Letter, Express Order, Stamps, or Money Order, but not checks.

American Blacksmith Company

P. O. Drawer 974 Buffalo, N. Y.
U. S. A.

Trade Literature and Notes.

Clark Manufacturing Company, of Moline, Ill., inform us that they have just placed upon the market the emery stand which is illustrated herewith, and which contains many novel features of interest. One of the features consists in the



rests, which can be raised, lowered or set at any angle to the face of the wheel, which is a great convenience for plow grinding work. In shops where there is power an emery grinder is of great service for plow and tool grinding. This firm makes the stand in two sizes, one of 200 pounds to carry two wheels up to 16 inches diameter and two inches thick, and a smaller one weighing 50 pounds and which carries two wheels up to ten inches diameter and 1½ inches face. Directions for making polishing wheels are included with the stand.

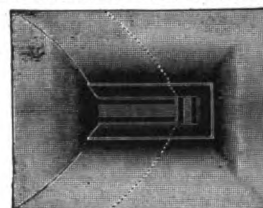
The Chapman Portable Forge Works, Marcellus, Mich. (see ad. on page IX) have issued several attractive circulars regarding their latest patterns of grinding machines and forges. They are free for the asking and those interested would do well to write. This company is also perfecting a gas engine possessing many excellent features.

A folder from H. S. Bossart & Co., Pittsburgh, Pa., is devoted to "Curine," a remedy for Spavins, Curbs, Ring Bone, Splints, Sprung Knee, Sprung Tendons, Navicular Disease, Thoroughpins, etc. A long list of testimonials is added.

The Standard Ball Axle Works of Lancaster, Pa., send a neat little folder, dealing with the Standard Ball Axle, and specifying the many advantages which are claimed for it. These may be summed up by the following adjectives—noiseless, self-oiling, dust proof, clean, strong and convenient.

THOMPSON EXTENSION TUYERE IRON

BEST MADE
Thousands now in use.



Size 15 x 20 ins.
Weight 50 lbs.
Depth 5½ ins.

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Saves coal and time; can get a long or short fire from 2 to 14 inches—meets all demands—Ask your jobber for them. If he can't supply you, write to us direct. Catalogue free.

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Thompson Tuyere Iron Co., Indianapolis, Ind.

Blacksmiths, Tool and Die Makers

Did You Ever Have a Broken Die?
If so, what was the cause?

Imperfect Annealing
of course.

USE

VULCAN ANNEALING PUTTY
and avoid further trouble.

Send for descriptive circular and price list. We guarantee to save you 50 per cent on your tool steel work or money refunded. Agents wanted.

The Ray Automatic Mach. Co.,
9 Water St., CLEVELAND, OHIO.

CUT SHOWS A

No. 5 Combined Punch and Shear



with 12-in. throat for punching 1 in., and a 12-in. blade for cutting No. 8 gauge metal, 2 x ¾ in. bars, ½ in. round, weight 525 lbs. Made in 18 different sizes, from 240 to 2,200 lbs. We make a specialty of shears, punches and rolls. Tools for shearing, punching and bending sheet metal, bar iron and angle iron

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"R. Mushet's Special Steel"

The Original Air-Hardening Steel

and STILL UNAPPROACHABLE in general excellence.

Thirty Years' Experience in Engineering Works in all parts of the World has proved Beyond all Doubt that this Steel is in every respect

THE BEST TOOL STEEL

YET MANUFACTURED

Uniformity of Quality in Every Bar. A Great Saving in Steel, Time and Wages, and Easy to Work. There are no difficulties to contend with in forging R. Mushet's Special Steel into tools and no loss in reheating. The best all-round Steel.

R. Mushet's HIGH-SPEED Steel.

If a fast-cutting steel is required, this is the best and most reliable of this grade. It will do more work than any other known steel, and every bar is uniform and free of the "Cracking" so generally a feature in steels of this grade.

The "R. Mushet's" Steels are manufactured only by **SAMUEL OSBORN & CO.**, Clyde Steel & Iron Works, Sheffield, England.

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EXCELLENCE OF PRODUCT



WEBER ENGINES

Are in use in EVERY State in the U. S. and in every foreign country.

7500 WEBER JUNIOR ENGINES
ARE IN USE IN ALL PARTS OF THE
WORLD GIVING SATISFACTION.

WE GUARANTEE all WEBER engines to be of the very best material and workmanship, and agree to replace any defective part, F. O. B., our own works, without cost for two years. We guarantee fuel consumption and interchangeability of parts. We guarantee the speed to be steady. WEBER GASOLINE ENGINES operate on one-tenth of one gallon of gasoline per horsepower per hour.



The 2 1/2-Horsepower WEBER JUNIOR as it appears at work.

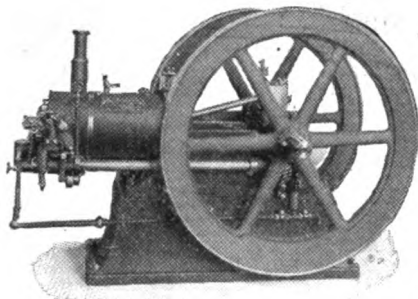
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Just out—gives much interesting and valuable information about gas engines. Also over 100 endorsements of the WEBER from blacksmiths and others. It should be in the hands of every blacksmith, wood-worker and shopowner. FREE. Send postal for it.

The Junior is shipped (crated) with all fixtures attached ready to set up and run, requiring no pipe fitting or connections—it is HORIZONTAL not Vertical. A horizontal engine is stiffer, safer, stronger and will last longer than any vertical engine on earth.

5 H.P.

This is another Blacksmith specialty we are building that is proving most satisfactory. Has electric and tube igniters, gasoline pump, underground tank, sensitive governor and all latest improvements.



5 H. P. WEBER.

GUARANTEED ABSOLUTELY O. K.

EVERY ENGINE CRITICALLY TESTED BEFORE SHIPMENT.

Other sizes up to 300 H. P. in Engines and Hoists.

19 Years keeping everlastingly at it has developed the "Weber" to its high state of perfection.

PRICES owing to our exceptional facilities and the large quantities going through our factory, we are able to make the prices, like the engine **RIGHT**

Every Engine Sold is an Advertisement.

ADDRESS FOR PRINTED MATTER :

Every User of a WEBER is an Endorser.

Weber Gas and Gasoline Engine Co.

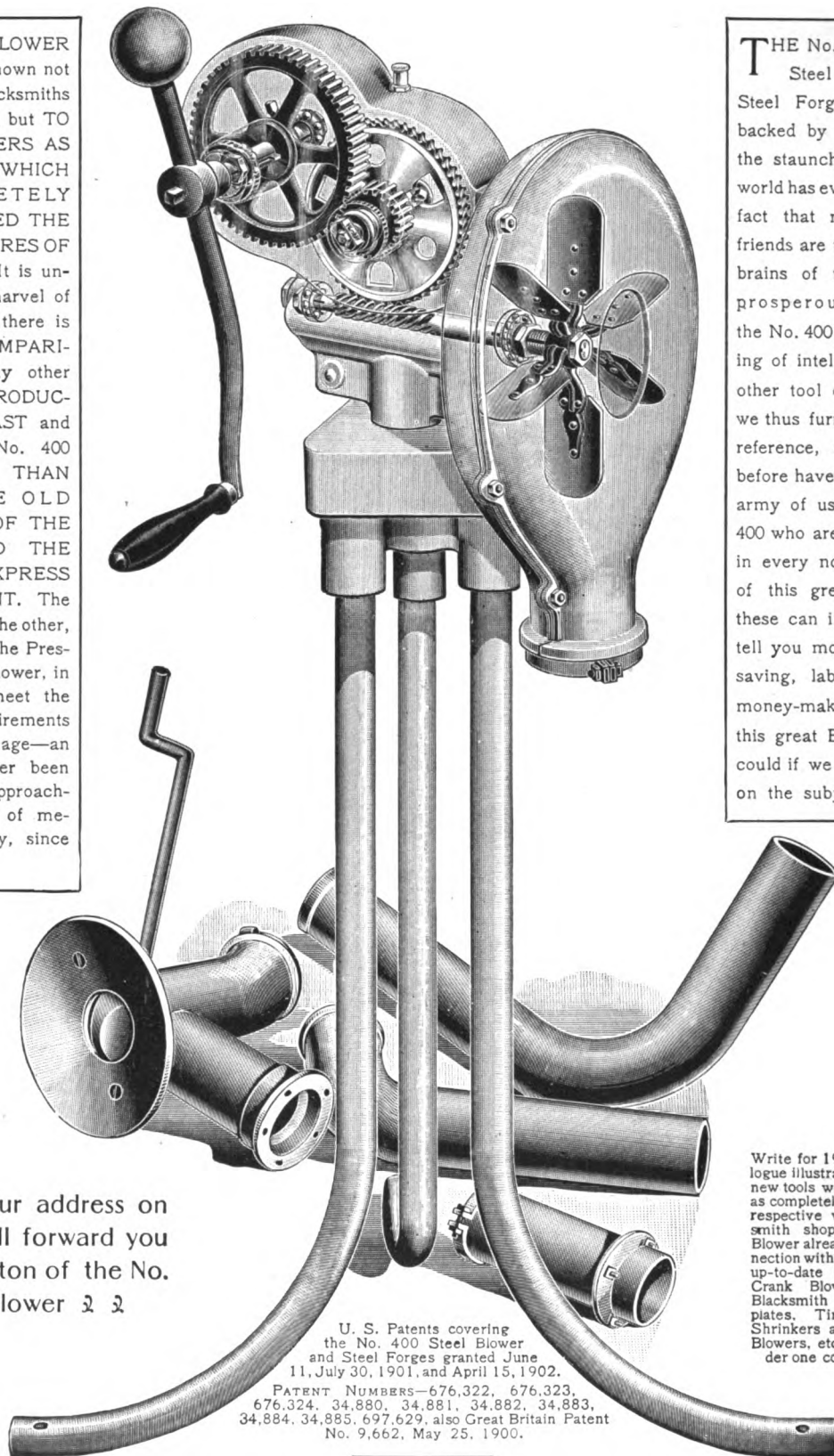
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KANSAS CITY, MO.

In its Fourth Year, with over 60,000 in use

THE No. 400 BLOWER in fact, is known not only to all the blacksmiths who have used it, but TO ALL THE JOBBERS AS THE BLOWER WHICH HAS COMPLETELY REVOLUTIONIZED THE BLACKSMITH FIRES OF THE WORLD. It is unquestionably the marvel of the century, and there is NO MORE COMPARISON between any other METHOD OF PRODUCING HAND BLAST and that of THE No. 400 CHAMPION, THAN BETWEEN THE OLD MAIL COACH OF THE PLAINS AND THE LIGHTNING EXPRESS OF THE PRESENT. The one is of the Past, the other, the No. 400, is of the Present. The only Blower, in brief, that can meet the high standard requirements of this intelligent age—an age that has never been equaled or even approached, in the matter of mechanical discovery, since the world began.

THE No. 400 Champion Steel Blowers and Steel Forges are now backed by over 60,000 of the staunchest friends the world has ever known. The fact that many of these friends are the mechanical brains of this great and prosperous nation gives the No. 400 Blower a backing of intelligence that no other tool can boast, and we thus furnish as our best reference, as we always before have done, the great army of users of the No. 400 who are now scattered in every nook and corner of this great land; and these can in one moment tell you more of the time-saving, labor-saving, and money-making qualities of this great Blower than we could if we wrote volumes on the subject.



By sending your address on a postal we will forward you a Souvenir Button of the No. 400 Blower 2 2

Write for 1903 228-page Catalogue illustrating several entirely new tools which we predict will as completely revolutionize their respective work in the blacksmith shop as the No. 400 Blower already has done, in connection with the largest and most up-to-date line of Lever and Crank Blowers and Forges, Blacksmith Post Drills, Screw-plates, Tire Benders, Tire Shrinkers and Welders, Power Blowers, etc., manufactured under one control in the world.

U. S. Patents covering the No. 400 Steel Blower and Steel Forges granted June 11, July 30, 1901, and April 15, 1902.
PATENT NUMBERS—676,322, 676,323, 676,324, 34,880, 34,881, 34,882, 34,883, 34,884, 34,885, 697,629, also Great Britain Patent No. 9,662, May 25, 1900.

CHAMPION BLOWER & FORGE COMPANY

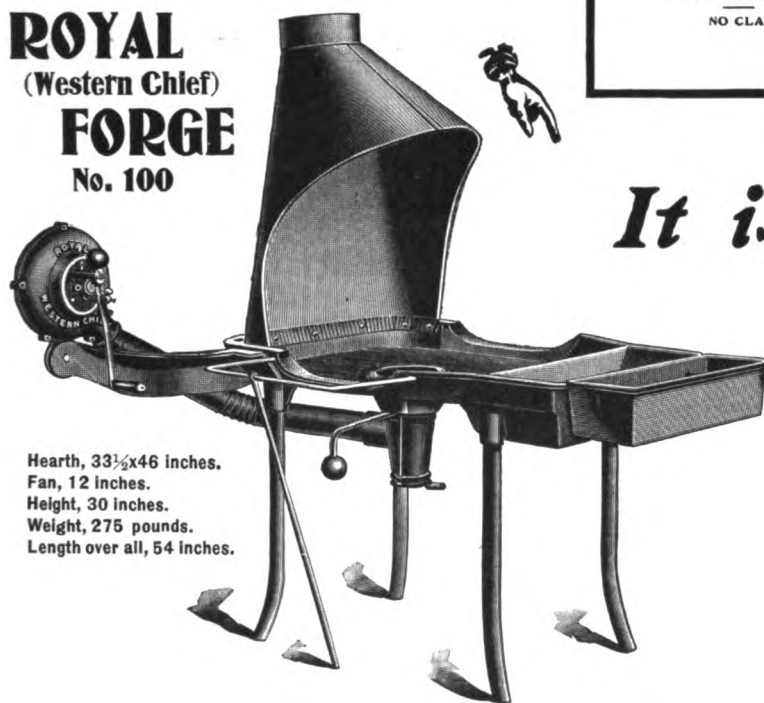
LANCASTER, PA. U. S. A.

ROYAL

WESTERN CHIEF

ROYAL
In Every
Sense

ROYAL
(Western Chief)
FORGE
No. 100



Hearth, 33½x46 inches.
Fan, 12 inches.
Height, 30 inches.
Weight, 275 pounds.
Length over all, 54 inches.

Reliable
Our Choice
Your Choice
America's Choice
Leads Them All



The
ROYAL FIRE POT
— NO CLAY

HANDSOMEST: Because its constructive design is symmetrical, attractive and beautiful.
SIMPLEST: Because fan case and column stand (2 parts only) is about all there is of it.
BEST: Because made of the best material, by the best workmen and best mechanical experience that can be obtained.

SUPERIOR POINTS.

No Belts, no Clutches, no Ratchets.
The blower case oscillates on its bearing, permitting nose of case to point down or out or up, as may be desired; meeting any angle of blow pipe, thereby saving one elbow and 10 per cent. of blast force; besides valuable room occupied by other blowers.
The crank turns forward or backward, as suits the operator.
The gears are Phosphor Bronze and Steel, cut on the most scientific principle; they are flat, and straight cut (no spiral or worm gears); which combined with Steel Shafts and Composition Bearings made and assembled perfectly, run noiseless, and make this the best blower in the world.
The Gear Case is oil tight and dust proof, permitting gears to run in a bath of oil.
The Blast is very powerful, and as positive and steady as a power blower, and takes less labor to operate than others. The after blast is strong and lasting.
The Column Stand and Iron Base give a solid, non-trembling foundation.
The room it takes is less than any other blower.

*It is the way
they are
built that
pleases so*

MADE BY
Canedy-Otto Mfg. Co.
CHICAGO HEIGHTS, ILL.

SOLD BY
First-Class Dealers
EVERYWHERE

	THE L. S. STARRETT, CO., ATHOL, MASS. U. S. A.	
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2 feet long, 3/4 inches wide, folding in middle. Made of Best Quality Spring Tempered Steel

BLACKSMITHS Will find this Steel Rule just what they need. We send it postpaid for 50 cents. *Y Y Y Y*

Catalogue of Fine Tools Free.

The L. S. STARRETT CO.
ATHOL, MASS., U. S. A.

PRENTISS PATENT VISES
ALL STYLES AND SIZES
FOR ALL USES

LARGEST LINE IN THE WORLD
ILLUSTRATED CATALOGUE - FREE

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Through Home Instruction.
Small Charge—Easy Terms.

Railroads need thousands of instructed Firemen annually. **GOOD PAY** and chance to become an Engineer. Help to employment on proper qualification. **PARTICULARS FREE.** Our Instruction and Recommendation are Recognized by Master Mechanics.

The Railway Educational Association
STATION B. 24 BROOKLYN, N. Y.

FOOT AND HAND POWER

Wood Working Machinery

For Carpenters, Wagon-builders, Cabinet-Makers and Wood Workers Generally..

Machines for Scroll Sawing, Ripping, Cutting Off, Mitering, Rabbitting, Grooving, Gaining, Dadoing, Beading, Edging Up, Boring, Mortising, Tennoning, Turning, Etc., for Working Wood in any manner.

Enterprising Mechanics are quick to see the Superior Merit of our Machines.

Machines Sent on Trial. Send for Catalogue "A."

The Seneca Falls Mfg. Co. 274 Water Street, Seneca Falls, N. Y.

We Furnish Wheels

with Rubber Tires on for the same price as others charge for re-rubbing old wheels. We furnish all sizes with steel or rubber tire. You are not prepared to meet competition without our prices.

Write quick for catalogue

AIR CUSHION RUBBER HORSESHOE PADS

THE MOST COMPLETE Line of **PADS** On Earth

Air Cushion, Banner, Acme, Giant, Ideal, A. C. Road, and Racing.

CHEAPEST ON THE MARKET.

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Revere Rubber Company
MANUFACTURERS BOSTON, MASS.

Leather Aprons

Sold by all Jobbers in the United States and Canada. . . .

Miniature "Aprons" showing material and how made, mailed upon application. . . .

Sole Manufacturer
Edmund C. Beckmann
712 North 4th St.
ST. LOUIS, MO., U.S.A.

PATHFINDER BAR.
Open.

Canvas Back.

GOOD YEAR
AKRON, OHIO

OPEN PADS

FOR SPRING AND SUMMER USE

Here are two of the old favorites you will need in your business in 1903.
If they are not the style you want, we have plenty of others. Your dealer has them or can get them for you.

INSIST ON GOODYEAR PADS

IMPROVED GOODYEAR-AKRON.

Canvas Back.

THE GOODYEAR TIRE & RUBBER COMPANY
PAD MAKERS AKRON, OHIO

The Crescent "Eveready" Plowshare

SAVES TIME, PATIENCE AND MATERIAL

Can be fitted to plow easily, quickly. Are welded securely, point finished and fully ground and polished.

ORIGINATED AND MANUFACTURED BY
HAVANA METAL WHEEL CO., HAVANA, ILL., U. S. A.

Manufacture a full line of CRESCENT Steel Lister shares. Subsoilers, Cultivator Shovels, Landis, Moldboards from Solid, Crucible and Genuine Soft Center Steels.

IF YOUR JOBBER DOES NOT HAVE THE CRESCENT WRITE US.
We are the Largest Manufacturers of Truck Wheels in all America.

Leather Aprons

For the Jobbing Trade.

Samples of Leather and prices on application

The Hull Bros. Co.
Danbury, Conn.

"IT IS THE MOST POWERFUL"



We claim that the Bliss Hoof Cutter is the most powerful tool of its kind on the market. By referring to the two cuts, one can see the difference between the Bliss and any tool of the double lever class. In the double lever class, represented by the lower cut, all the power is exerted at D, to be delivered to C. The distance between C and D is usually equal to one-third of the distance between C and E. Thus one-third of the power developed is absolutely lost.

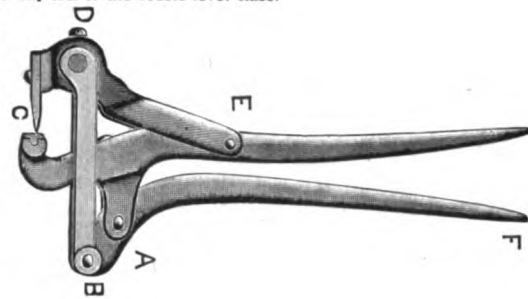
This class of cutter is usually levered at the ratio of 6 to 1, one-third being lost; the actual ratio is 4 to 1, to say nothing of loss by friction.

This explains why the double lever class of cutters is not as good as the old nippers, which developed power at the ratio of 6 to 1 with no loss. The Bliss Hoof Cutter is levered at the ratio of 20 to 1, with practically no loss of power. Therefore, "It is the most powerful."

FOR SALE BY THE HARDWARE TRADE.

EXPORT AGENT:
J. G. ROLLINS
NEW YORK AND 124 HOLBORN,
LONDON, E. C.

Bliss Manufacturing Co.
SOUTH EGREMONT, MASS.



Indianapolis Bolster Spring Company

Manufacturers of Bolster Springs, Spring Buffers and Hardware Specialties



THE VICTOR BUFFER

takes the place of old style rubber buffers. It outlasts the vehicle itself, and is put on without the use of bolts or straps.



KEELER CONICAL BOLSTER SPRING
Cheapest Bolster Spring on the market.



INDIANAPOLIS BOLSTER SPRING

The only adjustable Bolster Spring on the market.

INDIANAPOLIS, INDIANA, U. S. A.

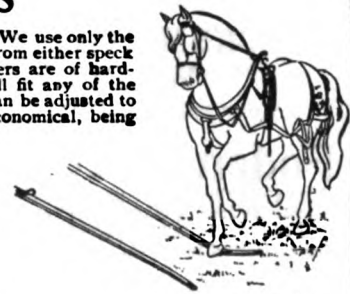
A NEW DEVICE FOR BROKEN SHAFTS



WE are now manufacturing only our new reinforced double Steel Neverbreak Shaft-Ends. We use only the best tempered steel and baking enamel, so that the finished shaft-end is remarkably free from either speck or tendency to chip or scale, making our device equal in finish to the best patent leather. Fillers are of hardwood. We guarantee every Shaft-End to be perfect in workmanship and material. They will fit any of the standard sizes of Buggy, Cart, or Surrey Shafts. Unlike all other shaft-ends, the Neverbreak can be adjusted to a broken shaft in less than five minutes; besides being a time-saving device they are also economical, being reversible, so that they can be adjusted to either right or left shaft.



Special
Sizes and
Curves
to order
If Desired

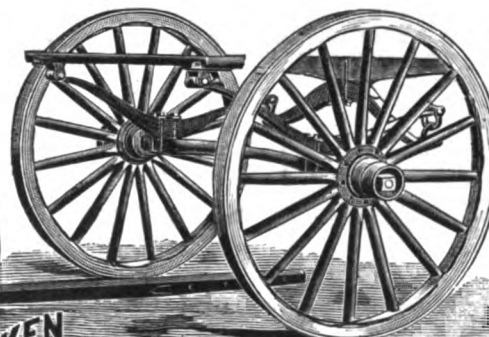
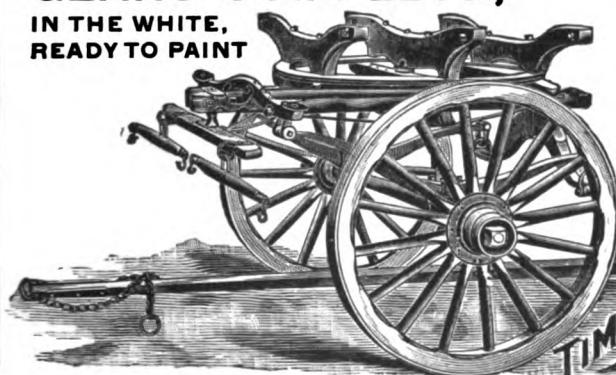


THE fine gradation in weight precludes the possibility of any vibration that would tend to weaken the repaired shaft.

Give us a TRIAL ORDER for a gross. This is a sure repeater.

Manufact'd only by NEVERBREAK SHAFT-ENDS CO., LTD., Battle Creek, Mich.

GEARS COMPLETE,
IN THE WHITE,
READY TO PAINT



TIMKEN
ROLLER BEARING AXLES
REDUCE THE DRAFT 50%

FOR LIGHT AND HEAVY
Delivery Wagons
ALSO FOR
Ice, Brewery and
Transfer Wagons

THE SELLE
GEAR CO.,
SOUTH HIGH ST.
AKRON, OHIO.

In writing for prices give full specifications and description of what is wanted, so as to enable us to make prompt quotations.

Trade Literature and Notes.

The Pontiac Hardware Specialty Company, Pontiac, Mich., are the manufacturers of a novel and useful little buggy attachment, which they claim will take up the wobble caused by worn parts, stop the throwing of dust and mud, make the buggy wheels to track perfectly, and the old buggy to pull at one-half the draught. The device is termed the extension axle nut, and those who use it state that it does all that is claimed for it.

Newton Steel Wheels, which are made by the Newton Steel Wheel Company, of Kalamazoo, Mich., are of novel and interesting construction, and the makers claim that they are stronger than wooden wheels and give fifty per cent. more wear, together with many other advantages. The claims which are thus made for them are well worth investigating by those who are interested. This seems to be the day when metal is being widely substituted for wood, and progress is being made along this line to a very great degree.

The Weber Gas & Gasoline Engine Company, Box V 1114, Kansas City, Mo., whose advertisement of 2½ and 5-horse-power engines for blacksmithing purposes appears on page XV, call our special attention to their line of Weber Junior Pumping Engines. They state that this engine is the windmill's successor, and that to farmers, irrigators, ranchers, etc., it has proven a great money saver for pumping water from deep and shallow wells for stock and home supply, operating feed mills, grindstones, small threshers, cream separators for dairy use, irrigation pumps, and in fact for all power applications around the farm and ranch. This engine is well illustrated in one of their late catalogues, with interesting cuts showing its practical applications.



Newton's Horse, Cough, Distemper and Indigestion Cure. A veterinary specific for wind, throat and stomach troubles. Strongly recommended. \$1 per can. Dealers, mail or Ex. paid. Newton Horse Remedy Co. (3) Toledo, Ohio.



\$60. Back-gear screw cutting foot or power LATHES, made in large lots with special tools; swing ten inches over bed. Our ten years of manufacturing, small lathes enables us to make a low price on a high grade tool. Write for guarantee, circulars and discount.

Carroll & Jamieson Machine Co. BATAVIA, - - OHIO.

DODGE HALEY & CO., Boston, Mass. Blacksmiths' and Carriage Makers' Supplies.



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NO BLACKSMITH SHOP COMPLETE WITHOUT POWER.

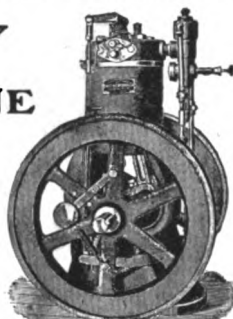
No Power so

HANDY

as a Good

GASOLINE ENGINE.

Let us send you our catalogue and quote prices. Our Specialty 1½, 2½ and 4 H.P. State your power needs. If you have a Steam Engine give full description. We sometimes make exchanges.



BATES & EDMONDS MOTOR CO., - Lansing, Mich.

"HELLO YOUR FELLERS"

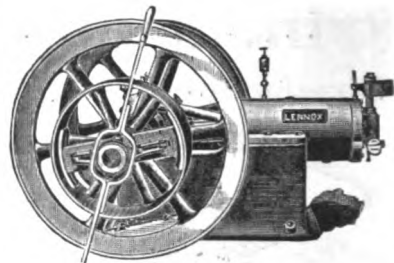
If you are looking for Gas or Gasoline Engines write us for our catalogue and prices on engines before you place your order.

We will tell you something that will surprise you. 1½ to 8 H. P. 2 and 4 Cycle Engines.

BAY STATE MACHINE CO.
1211 Peach St., ERIE, PA.

Lennox Machine Co.

Manufacturers of the Lennox Stationary Gas and Gasoline Engines for General Purposes



Complete Blacksmith Power Outfits. Shafting. Hangers, Pulleys, Belting and Emery Stands.

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We are selling a book that you will find of the greatest value in your shop

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Giving Circumferences of Circles by eighth inches up to twenty feet. Weight of Rectangular Iron, Round and Square Bar Iron, Angle and Sheet Iron, and other miscellaneous tables. Neatly Bound in Cloth. Price, 50 Cents. Postage Prepaid.

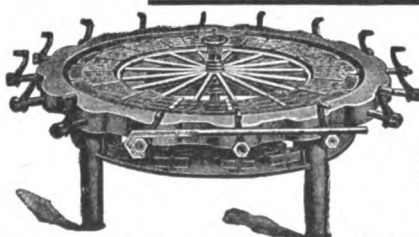
American Blacksmith Company
Drawer 974 - - BUFFALO, N. Y.

When you buy a Hand Power Tire Setter

get the best one made

It is the **Henderson**

700
have been
made
and sold



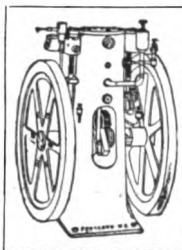
The first
and last
practical
hand power
tire setter

It sets tires cold, keeps the dish just right and puts a wheel in the best possible condition. It tightens spokes in hub and rim and all joints.

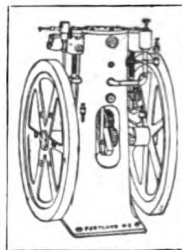
Write for Circulars, Prices and Terms.

STANDARD TIRE SETTER CO.
KEOKUK, IOWA.

The American Gasoline Engines



AS GOOD as the American. In all trades and crafts there is one article whose merit is beyond question, so that when

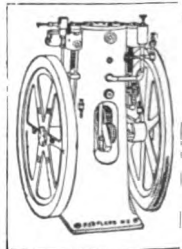
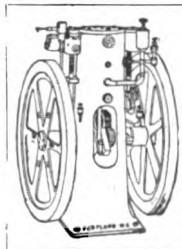


a rival maker wishes to extol his particular kind of goods he says as good as So-and-So's. In the Gasoline Engine Field the

AMERICAN

is at the top. It is the engine whose merit is beyond question. It is constructed on absolutely correct lines. If you require power, then you require the American Gas or Gasoline Engine.

An investigation of its merits will save you a mistake in the purchase of a power. Do not buy an Engine until you see our catalogue, you will then buy the American.

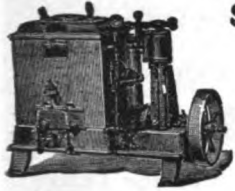


AMERICAN GAS ENGINE COMPANY

241 KENNEBEC STREET, PORTLAND, MAINE.

HONEST DEALINGS.

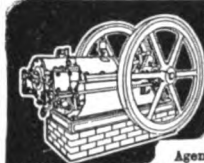
Before an advertisement is accepted for this journal, careful inquiry is made concerning the standing of the house signing it. Our readers are our friends and their interests will be protected. As a constant example of our good faith in AMERICAN BLACKSMITH advertisers, we will make good to subscribers loss sustained from any who prove to be deliberate swindlers. We must be notified within a month of the transaction giving rise to complaint. This does not mean that we will concern ourselves with the settlement of petty misunderstandings between subscribers and advertisers, nor will we be responsible for losses of honorable bankrupts.



Shipman's Steam Engine

The safest, best and most efficient power for blacksmith and wagon shops. Refined or crude oil used. Be sure and get my prices and catalogue—free.

CHAS. W. PERCY
212 Summer St., Boston



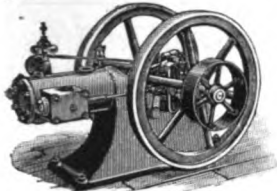
LAMBERT

Gas or Gasoline

Is the reliable engine. No long shut-down for repairs. Simple, economical. Easy to regulate speed. Strong guarantee.

Agents wanted. Write for catalog.
D. LAMBERT GAS & GASOLINE ENGINE CO., Anderson, Ind.

AS NEARLY PERFECT AS CAN BE MADE is what we claim for our GAS AND GASOLINE ENGINES.

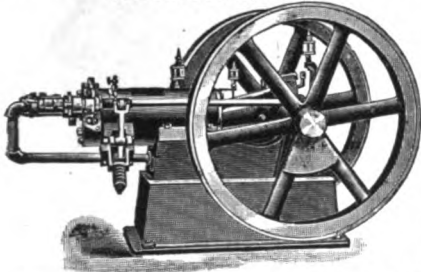


These Engines are the result of twenty years' practical experience, and are unsurpassed for efficiency of operation and quality of workmanship.

OUR CATALOGUE WILL INTEREST YOU.

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"MIAMI" GAS AND GASOLINE ENGINES
THE MIDDLETOWN MACHINE CO.
MIDDLETOWN, OHIO.



WRITE US AND JUDGE FOR YOURSELF.

"THE BEST IS NONE TOO GOOD"

"GUS" GAS AND GASOLINE ENGINE

A MODEL OF PERFECTION

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BARGAINS In Rebuilt Second-hand GASOLINE ENGINES

Good as New

Also New Gas and Gasoline Engines

GET MY PRICES

J. MONTGOMERY JOHNSTON
216 LAKE STREET - CHICAGO, ILL.

OUR GAS and Gasoline ENGINES Operate at the least possible expense and your blacksmith shop is not complete without one. It can be started in a moment, requires no attention after starting and will not affect your insurance.



Our 3½ Vertical Straight Line Engine will be furnished complete, equipped for gas or gasoline, including hot tube igniter, starting crank, atomizer, gasoline tank, water tank, piping, and fully guaranteed.

\$115 Cash, or \$145 on Time.

LAZIER GAS ENGINE CO.

585-593 ELLICOTT SQUARE
BUFFALO, N. Y., U.S.A.

SIMPLICITY IS A FEATURE OF OUR ENGINES.

Anyone can start and run them.

Superior Construction.

High Grade

Gas Engines

AT REASONABLE COST



Agents wanted in unoccupied territory. Write for catalogue and prices. Mention the American Blacksmith.

Rumsey-Williams Co., St. Johnsville, N. Y.

FAIRBANKS-MORSE
Gas and Gasoline Engines

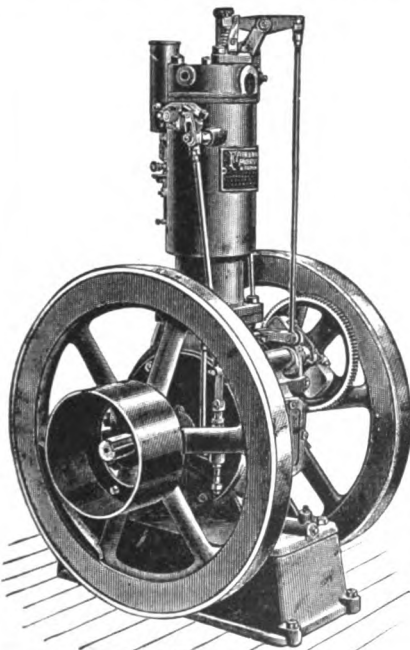
2 to 150 HP.

Horizontal and Vertical

OUR VERTICAL ENGINES Are Specially Adapted for Use in Blacksmith Shops.

Built in 2, 3 and 6 HP. Sizes.

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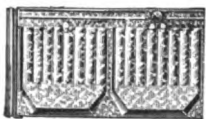
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With Montross Telescope Side-Lock is the best roofing in the world for house or barn. Storm proof. Easily applied. Catalogue, Prices and Testimonials free for the asking.

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"The Australasian Coachbuilder & Wheelwright."

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"AND DON'T YOU FORGET IT."

Mohr's Blowers

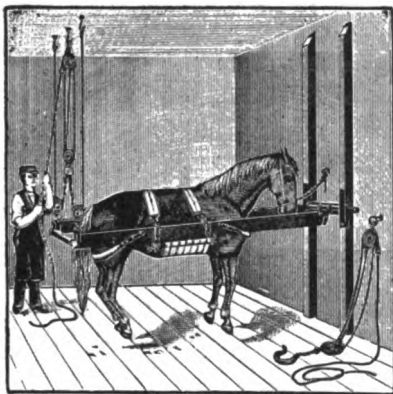
FOR BLACKSMITHS. . . .

Are guaranteed equal to any, are more convenient, require less room and have a wider range of adjustment.

CIRCULARS FREE.

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..SAFETY.. HORSE SHOEING RACK



Most Simple and Convenient Rack Made

Write for Circulars and Prices.

Hunt, Helm, Ferris & Co.,
HARVARD, ILL.

LEE J. AUBRY CARRIAGE CO.

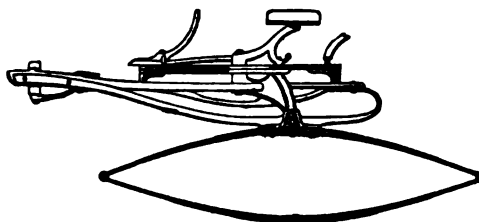
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New Haven, Conn.

Builders of all kinds of

COACH GEARS

And Forgings for the Trade

Tell us what you want, and you will get it. Write us at once.



HEARSE CARRIAGE GEAR
WITH IRON TOP BED



To Owners of Gasoline Engines, Automobiles, Launches, Etc.

The Auto-Sparker

does away entirely with all starting and running batteries, their annoyance and expense. No belt—no switch—no batteries. Can be attached to any engine now using batteries. Fully guaranteed.

Write for descriptive catalogue.
MOTSINGER DEVICE MFG. CO.
33 Main St., Pendleton, Ind.

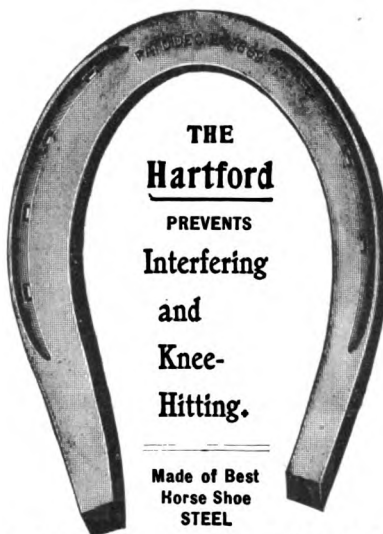


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Especially for Blacksmiths and Machinists, also Hand and Power Planers and Shapers and Machinists' Supplies.

Catalogue M.

SHEPARD LATHE CO., 132 W. 2d St., Cincinnati, O.



THE Hartford

PREVENTS

Interfering
and
Knee-
Hitting.

Made of Best
Horse Shoe
STEEL



BOSS TOE WEIGHT

Made of
REFINED IRON

Do You Use the best Side Weight and Toe Weight Shoe made in this country? If Not, Why Not? They cost you less labor and money and are superior to a hand made shoe. Carried by all leading jobbers. Sample pair of either size or weight mailed, postpaid on receipt of 50 cents. We make four sizes Nos. 1, 2, 3, 4. Three weights—Track, Medium, and Heavy.

THE SIDE WEIGHT HORSE SHOE CO.
MECHANIC STREET, HARTFORD, CONNECTICUT.

PROPRIETORS.
WM. WILHELM, A. R. KOEHLER.

GR. DIVISION AND FLICOTT'S

HALF TONE PROCESS

WOOD & FINE WAX

ENGRAVING

ZINC ETCHING

ELECTROTYPING

GIVE US A TRIAL

OUR FACILITIES ARE OF THE LARGEST

Buffalo Electrotypes & Engraving Co.

"TRINITY TRUE"

HIGH SPEED TOOL STEEL

PLENTY OF LATITUDE FOR HEATING. EASY TO MACHINE.
ESPECIALLY DESIGNED FOR HEAVY CUTTING.

NO TRICK IN TEMPERING.
BEST STEEL FOR HOT WORK.

WESTMORELAND STEEL CO.,

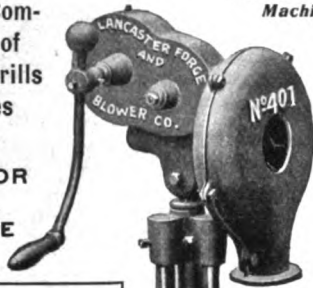
PITTSBURG, PA.

LANCASTER BLOWER

No. 401

We Build a Complete Line of Blacksmith Drills and Forges

WRITE FOR NEW CATALOGUE

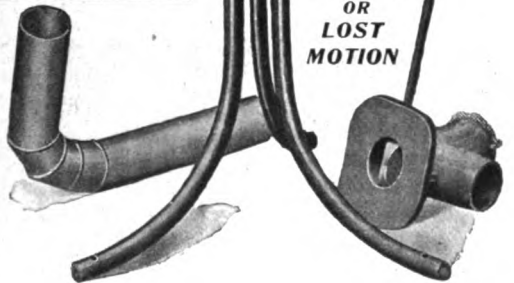


This Blower has accurate Machine-Cut Gears and Direct Drive Spiral Gearing and will supply more air and that at a higher pressure for the same amount of power than any other upon the market.

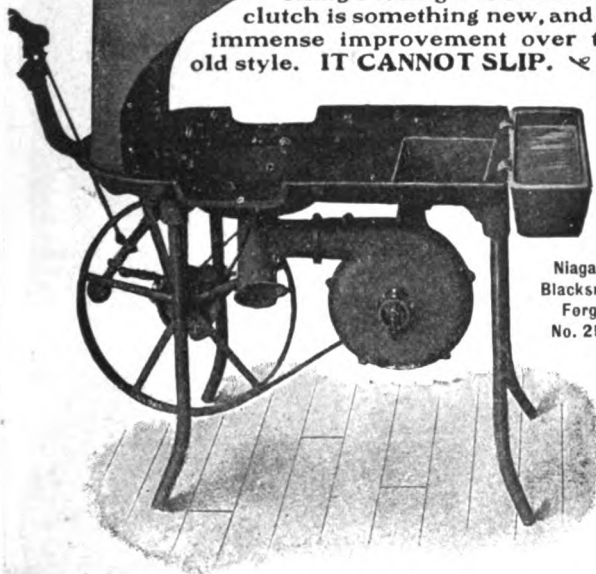
OUR Forges are up-to-date, having valuable features, found in no other forges. Built for heaviest work. Furnished with our new ball tuyere and improved fire pot with centre and side blast, still friction clutch and ring-oiling bearings.

**SIMPLE
COMPACT
SMOOTH
AND
NOISELESS**

**NO SLIP
OR
LOST
MOTION**



THE Ring-Oiling Bearing does away with the wasteful friction, prolongs the life of the machine, and doubles its ease of running. Our Portable Forges are the only ones on the market built with ring-oiling bearings. Our friction clutch is something new, and an immense improvement over the old style. **IT CANNOT SLIP.** ♡ ♡



Niagara
Blacksmith
Forge
No. 250

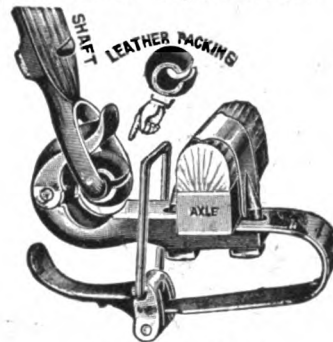
Lancaster Forge & Blower Co.

BUFFALO, N. Y.

If the life of a carriage could be measured by the life of a

BRADLEY SHAFT COUPLING

The life of such a carriage would be long indeed. The **BRADLEY'S** period of use-



COUPLING OPEN

fulness is equal to that of any vehicle equipped with it. The *entire wear* comes on the leather packing—the only separate part of the **BRADLEY**. This leather packing (see cut) can be replaced at any time. The **BRADLEY** is a noiseless, quick-shifting **BALL BEARING** coupling that, with proper care and under proper usage, will be always serviceable.

C. C. BRADLEY & SON,
Syracuse, N. Y.

BUFFALO DOWN DRAFT FORGES
 NO SMOKE - NO OVERHEAD PIPES - NO REPAIRS
 TYPES FOR ALL WORK . 60 SIZES . *SEE NEW CATALOGUE*



BUFFALO FORGE COMPANY
 NEW YORK PHILADELPHIA BUFFALO, N.Y. CHICAGO PITTSBURG
 ©INNER CHI.



Every genuine "Hay-Budden" Anvil is made of the best *American Wrought Iron* and faced with best *Crucible Cast Steel*. Every Genuine "Hay-Budden" Anvil is made by the latest improved methods.

Hay-Budden

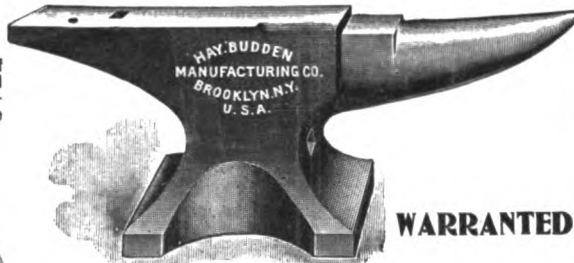
Solid Wrought

ANVILS

THE GOLD MEDAL ANVIL
 HIGHEST AWARD

OMAHA, 1898

PAN-AMERICAN, 1901



WARRANTED

WEIGHTS FROM 10 TO 800 LBS.

OVER 75,000 IN USE

Experience has proved their worth and demonstrated that "Hay-Budden" Anvils are Superior in Quality, . . Form and Finish to any on the Market . .

HAY-BUDDEN MFG. CO.

254-278 N. Henry St., Brooklyn, N. Y.



PATTERNS—Regular Blacksmith, Farriers', Farriers' Clip Horn, Plow Makers', Double Horn, Saw Makers', Instrument Makers', Chain and Axe Makers', Etc., Etc., Etc. Send for Descriptive Circular.



AMERICAN BLACKSMITH

BUFFALO
N.Y. U.S.A.

A PRACTICAL JOURNAL OF BLACKSMITHING
JUNE, 1903

\$1.00 A YEAR
10¢ A COPY

Weber

Over 7,500 Weber Junior Engines now in use

OUR NEW CATALOGUE

Just out—gives much interesting information. Over 100 endorsements of the WEBER from blacksmiths and others.

FREE
Send Postal for it

Every
Blacksmith
and
Wagon Builder
should
have it.



WE GUARANTEE

all WEBER engines to be of the very best material and workmanship, and agree to replace any defective part, F. O. B., our own works, without cost for two years. We guarantee fuel consumption and interchangeability of parts.

Our Nineteen Years of Experience goes with each "Weber"

All Sizes
Built
up to
300
Horsepower

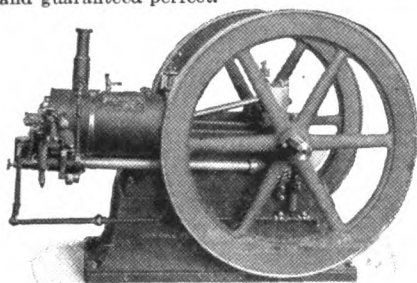
The 2½-Horsepower WEBER JUNIOR as it appears at work.

The Junior is shipped (crated) with all fixtures attached ready to set up and run, requiring no pipe fitting or connections.

Weber Engines operate on one-tenth of one gallon of gasoline per horsepower per hour.

5 H. P. Webers are being bought by blacksmiths all over the country. Just the engine for those who need more power than 2½ horsepower. Have electric and tube igniters, gasoline pump, underground tank and latest improvements. Each engine critically tested and guaranteed perfect.

Every User of a WEBER is an Endorser.



5 H. P. WEBER.

BRANFORD, CT.
GENTLEMEN:—I am the owner of the BEST and CHEAPEST gasoline engine built—the WEBER JUNIOR. I have never spent a penny for repairs. Can start or stop in five seconds. She is driving a drill press, emery grinder, blower, trip hammer and heavy punching press. JOHN DONNELLY.

COFFEYBURG, Mo., April 19, 1903.
GENTLEMEN:—I have a 2½ horsepower Weber Gasoline Engine, and it is a dandy. I run a 12 in. x 2½ in. emery wheel, a 12 in. polishing wheel for polishing plow shares and other work, a grindstone, a table for 14 in. rip and cut-off saws, a shaper which carries a 5-in. cutter head, a jig saw, a spoke tenoning and felloe boring machine combined, a No. 2 Bailey power drill, and I have just put in a power blower for four fires. This little engine will run all of these machines at once, except the shaper, which takes more power. It will run it and any other one of the machines. I also have a wood turning lathe. The engine takes off much of the hard work attached to our trade. I doubt if there is any better engine made for power than the Weber. It is safe and simple. S. G. MOONEY.

NOTE:—This is an unsolicited testimonial; see page 180 of this paper.

PRICES owing to our exceptional facilities and the large quantities going through our factory, we are able to make the prices, like the engine . . . **RIGHT**

Weber Gas and Gasoline Engine Company

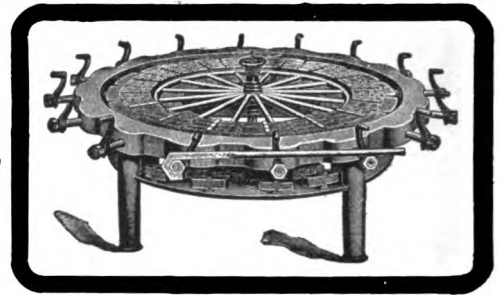
POST OFFICE BOX V 1114 KANSAS CITY, MISSOURI

It Sets them Cold by Hand.

The Vehicle Repairer's Best Friend is the

Henderson ^{Hand} _{Power} Tire Setter

**Because it Sets Tires Cold, Keeps the Dish Just Right
and Tightens all Joints in a Wheel.**



*The Greatest Labor-Saving and Money-Making
Machine ever Offered Blacksmiths and Wagon Men.*

Made \$32 in One Day.

STAPLES, TEXAS, NOV. 19, 1901.
Gentlemen: The machine has done all and more than you claim it to do. It has been a money-maker for us. Has increased our trade and gave our customers perfect satisfaction. We could not do business without it. It is a great thing over the old way of setting tires; it has more than paid for itself. One day we made \$32 with the machine and I think it is one of the grandest things that was ever invented for blacksmithing. Respectfully,
LAWMAN & WILSON.

You don't have to remove any bolts or worry about the dish.

No complicated parts to get out of order. A thousand users endorse the Henderson.

The machine will draw trade, give you control of the tire setting business in your neighborhood, and **MAKE MONEY FOR YOU.**

Write for descriptive circulars and prices

STANDARD TIRE SETTER COMPANY

KEOKUK, IOWA, U. S. A.

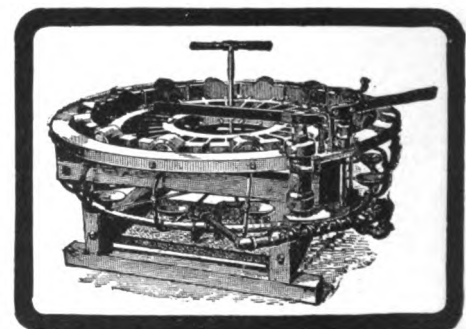
What They Think of Their "West" Tire Setter

TO THE WEST TIRE SETTER COMPANY.

NEW BEDFORD, MASS., April 15, 1903.

GENTS:—We have worked your Tire Setter for six years, and it has given us good interest on money invested, and has given entire satisfaction to every one of our customers, as it worked good on every job we have done with it. We have set tires 6 in. x 1 in., 5 in. x 1 1/4 in., 5 1/2 in. x 1 in., steel tires and all smaller sizes, the first year, and which are, and have been, in use up to date every day carting rocks over good and bad roads without any sign yet of getting or being loose. We have set tires also on invalid chairs with 3/8-in. round spoke, the wheels just fitting inside the ends of rams and did a very nice, good job, to the disappointment of eight spectators, who were present to see the little wheels get smashed by the big powerful machine, but "nit," as the machine has in all those six years NEVER hurt a spoke, rim or hub in any way.

The time we bought this machine we looked at the sum of money it cost as enormous (you know we have very few millionaire blacksmiths) but after sixteen months we had principal, interest and expenses back again, which is not found in every investment, besides saving a good many drops of sweat by not having to work so hard as the old way, let alone the time we saved. We don't advertise this machine in newspapers and other places, but let the machine do it by better work and less time, which counts for our customers as well.



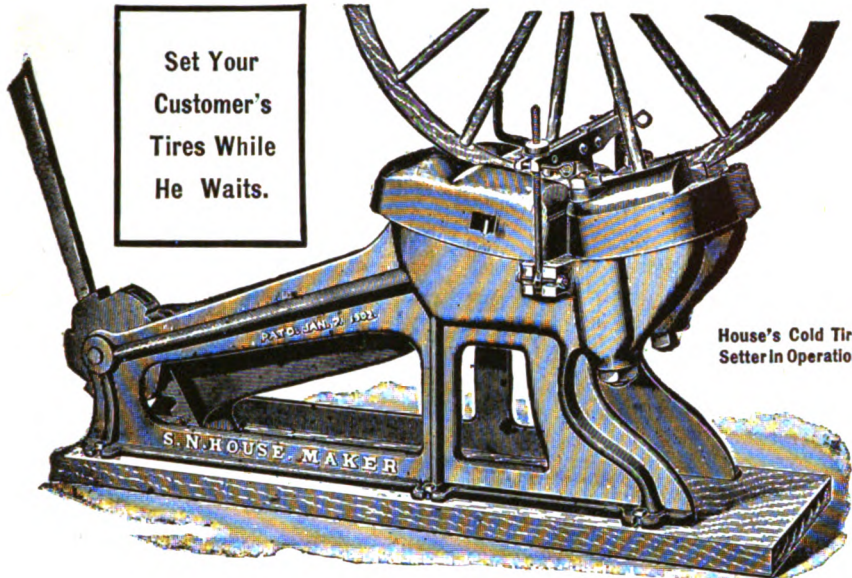
CAUTION. On March 31, 1903, The West Tire Setter Company filed a bill in the United States Circuit Court, Southern District of Iowa, against the National Machine Company, of Keokuk, for infringement of the West patents. USERS of infringing machines are warned that they are equally liable with the manufacturers.

If anyone in our section should want to see the machine work, or wants any information about it, you are at liberty to refer same to us, as we are willing to help them; we are ready and willing to live and let live. Yours,
FICHTENMAYER & FLYNN.

The West Tire Setter Co.
ROCHESTER, N. Y.

THE HOUSE COLD TIRE SETTER

Set Your
Customer's
Tires While
He Waits.



SOLD ON TRIAL. 9 9 9 GUARANTEED TO DO EXACTLY AS REPRESENTED OR NO SALE AND WE LOSE THE FREIGHT.

ONE MAN Can Set
Four Tires
In Twenty Minutes.

**NOT NECESSARY TO REMOVE
THE TIRES OR THE BOLTS**

**It Does Not Crush or Injure
the Wheel.**

You cannot afford to lose an hour taking off a tire and setting it the old way, for you can do it better with this machine in five minutes and save your fuel and bolts. It does not injure the tire nor woodwork, for it simply grips the tire on the edges in two places close together and shrinks it in a two or three-inch space, cold, just as we have been doing for years after they had been taken off and heated.

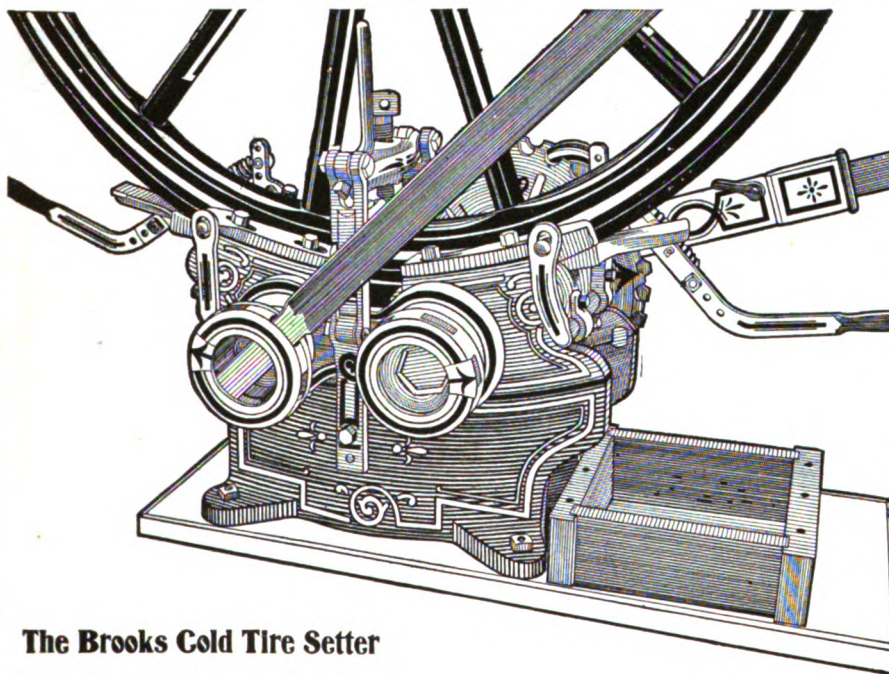
The grip keys are eight inches long, so they cannot scar nor cup the tire. The wheel is screwed down firm against the machine so that the tire cannot kink while setting. It sets them quickly and nicely, and it is the only machine that does. It is as simple and easily operated as the hot tire setters, made on the same principle, and will last forever. It is made of steel and cannot be broken; it weighs seven hundred pounds. Write at once for descriptive circular and price, which is very reasonable.

Will ship on trial. It is manufactured by
S. N. HOUSE, St. Louis, Mo.

**MacGowan & Finigan Foundry
and Machine Co.**

SELLING AGENTS,

**41, 42 AND 43
GAY BUILDING ST. LOUIS, MO.**



The Brooks Cold Tire Setter

sets heavy and light tires cold without removing tires or bolts from the wheels and without crushing or overdishing the wheel. A great trade drawer and money maker.

Send for our special winter terms and prices.

**SHIPPED ON TRIAL AND
SOLD ON ITS MERITS.**

If not satisfactory and as represented, we pay the freight both ways.

Garber, Okla., Dec. 27, 1902.
AMOS FUNK & SON, Enid, O. T.

Dear Sirs:

In regard to your inquiry as to the Brooks Cold Tire Setter I will say: I bought one of these machines about the middle of August and set in the first five days 110 tires. I think the Brooks is the only cold tire setter made that will do the work properly without any damage to the wheels. Since I bought this machine I have done at least 90 per cent. of the setting that has been done in this town.

In ordinary cases I can set four tires in fifteen minutes. The machine takes up but little room in a shop and is the greatest money maker I ever saw. Every tire I have set with this machine has pleased the customers.

I have not set a tire hot since I have had the "Brooks Cold Setter." I have not broken or crimped a tire with it since I have had it and have set all kinds of tires up to two inches in width and three quarters inch thick.

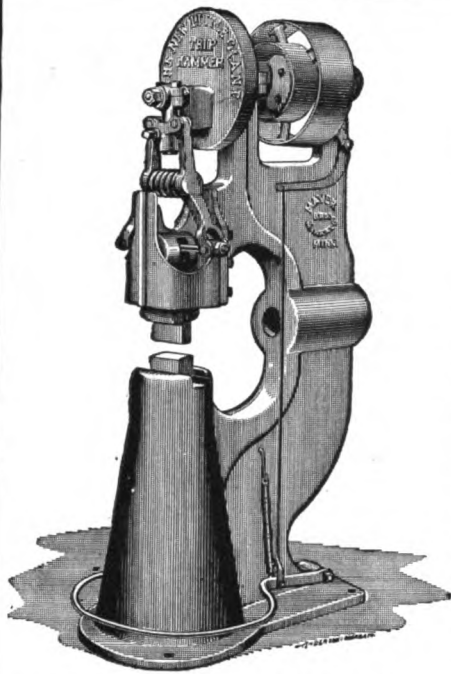
If I knew as much about the "Brooks Cold Tire Setter" as I do now and did not have one would buy one to-day and wouldn't wait till to-morrow, if it cost three times the price that it does.

I think this will give you my opinion about the "Brooks."

Yours truly,
JOHN H. MIESNER

BROOKS TIRE MACHINE COMPANY,

121 North Water Street, - - WICHITA, KANSAS.



THE NEW LITTLE GIANT
U. S. PATENT, JANUARY 1, 1901
CANADA PATENT, AUGUST 20, 1901

550 NOW IN USE

TRIP HAMMERS

NOW IS THE TIME TO BUY

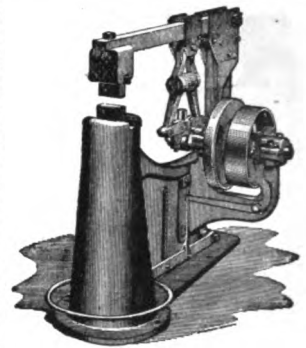
A TRIP-HAMMER

Is the Blacksmith's

BEST HELPER

And Will Pay for Itself

IN ONE YEAR



THE EASY
PATENT APPLIED FOR

50 NOW SOLD

For Prices and Information

Write to

MAYER BROS.
MANKATO
MINN.

MENTION
THE AMERICAN
BLACKSMITH

The Hawkeye Power Hammers

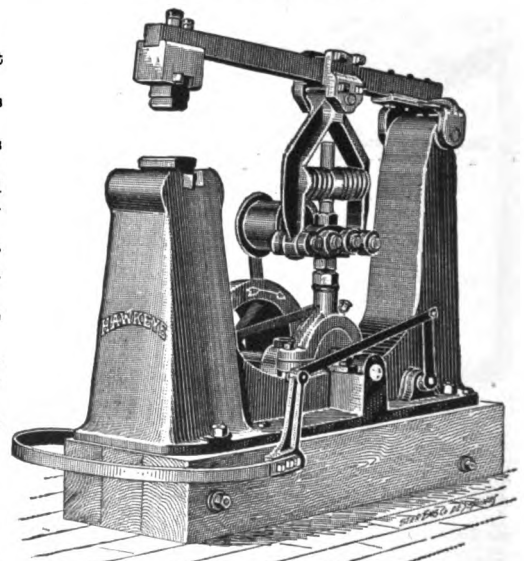
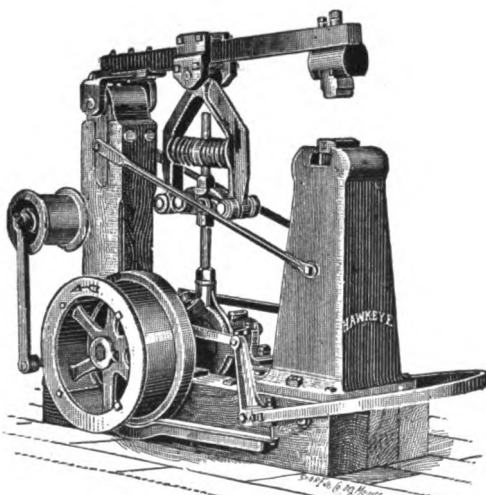
There are many trip hammers. Which do you prefer?

If it is

The one that will do the best
plow work,
The one that will weld tires
and axles,
The one that blacksmiths
recommend,
The one that carriage and
wagon builders recom-
mend,
The one that will pay for
itself in less time than
any other,
The one that will do the
largest range of work,
The one that is light running,
The one that is fully guaran-
teed,
The one that is sold at the
right price,

**It is the
HAWKEYE**

We build them in two sizes.



WRITE FOR PRICES AND FULL INFORMATION

HAWKEYE MANUFACTURING COMPANY

MENTION "THE AMERICAN BLACKSMITH."

TAMA, IOWA.

99

SPUR GEARS ARE GEARS ON PARALLEL AXES.

99

SPUR GEARS

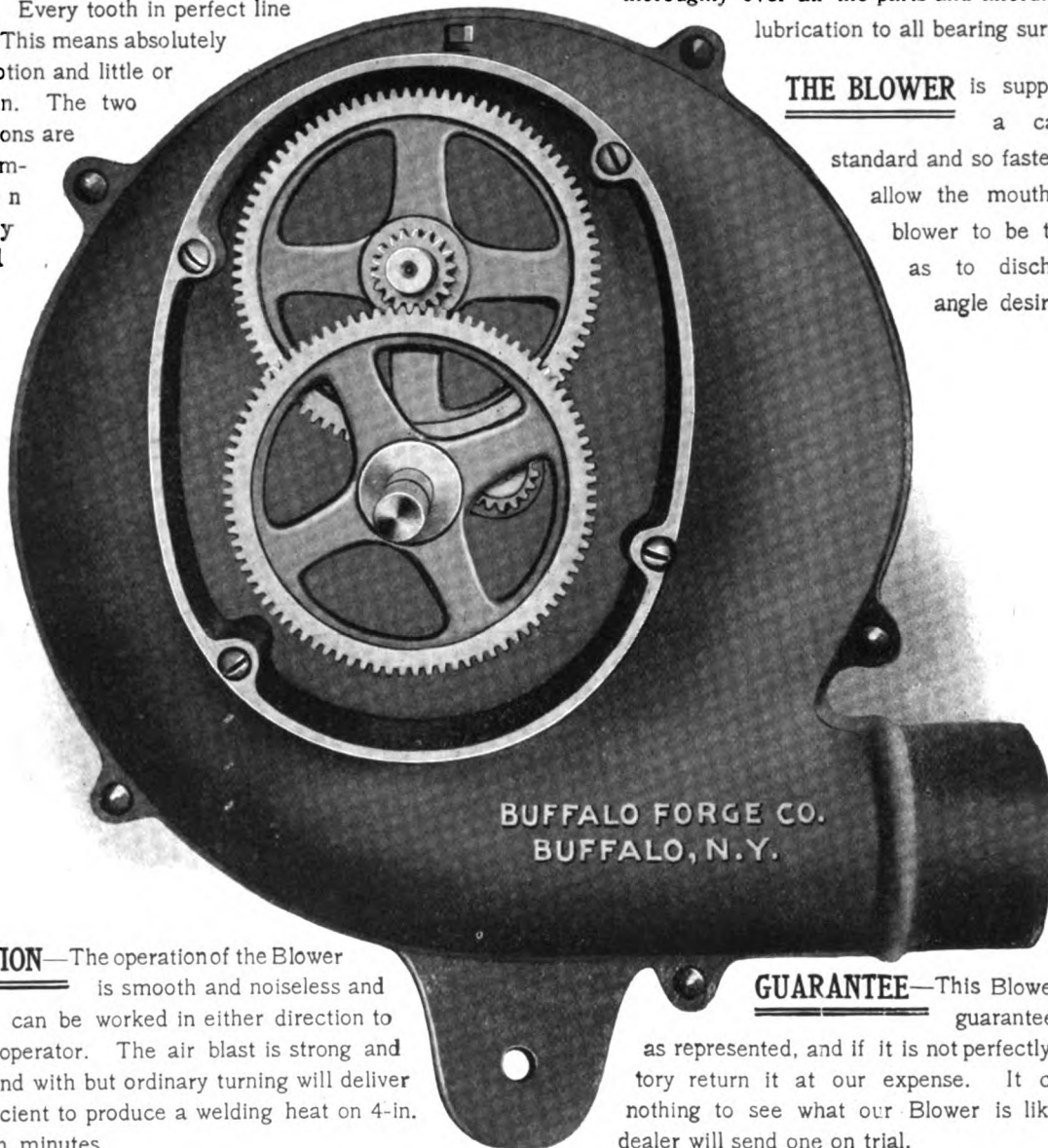
AS THEY OPERATE IN OUR No. 99 HAND BLOWER

SIMPLICITY—As shown by the illustration only four gears are used. This is a winning feature as there is no complicated machinery to get out of order.

THE GEARS—The two main gears are perfect castings, machine cut, accurate and true. Every tooth in perfect line contact. This means absolutely no lost motion and little or no friction. The two small pinions are special composition perfectly cut and adjusted.

LUBRICATION—The four gears are enclosed in a dust proof frame. The frame is made perfectly tight so that oil to the depth of one inch may be maintained at the bottom of the case. In this the lower gear wheel constantly revolves, throwing the oil thoroughly over all the parts and affording ample lubrication to all bearing surfaces.

THE BLOWER is supported on a cast iron standard and so fastened as to allow the mouth of the blower to be turned so as to discharge at angle desired.



OPERATION—The operation of the Blower is smooth and noiseless and the crank can be worked in either direction to suit the operator. The air blast is strong and uniform and with but ordinary turning will deliver blast sufficient to produce a welding heat on 4-in. iron in ten minutes.

GUARANTEE—This Blower is fully guaranteed to be as represented, and if it is not perfectly satisfactory return it at our expense. It costs you nothing to see what our Blower is like. Your dealer will send one on trial.

SEND NAME AND ADDRESS FOR LATEST CATALOGUE

99

BUFFALO FORGE COMPANY
BUFFALO, N. Y.

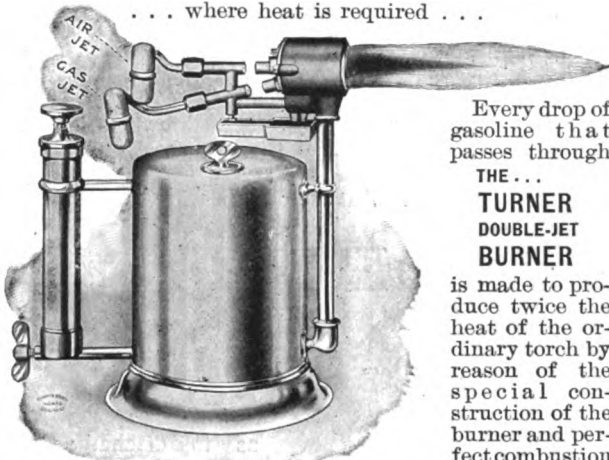
99

BRAZING RETAINING WIRES
FOR SOLID RUBBER TIRES
MADE EASY WITH



The **TURNER** **DOUBLE-JET Gasoline TORCH**

The highest degree of mechanical heat is obtained from this torch and it is unexcelled for all purposes . . . where heat is required . . .



Every drop of gasoline that passes through THE . . . **TURNER DOUBLE-JET BURNER** is made to produce twice the heat of the ordinary torch by reason of the special construction of the burner and perfect combustion of air and gas.

No. 4 A Double-Jet Torch, each, \$4.50
Shipping weight, 4½ lbs.

THE TURNER BRASS WORKS,
63 No. Franklin St., CHICAGO.

TERMS:
Cash with
Order
or
C.O.D.

MONEY TALKS

Send to us for **CASH PRICES**
on our

BLUE LINE VARNISHES

We give you a guarantee to protect you. You get the best value for the least money.

Lilly Varnish Company
INDIANAPOLIS, IND.

LIGHT Vehicle Wheels

as manufactured by us are held up for the world's criticism. We make ALL KINDS, painted ANY & & COLOR, or, IN THE WHITE. & &

THE PRICE WHICH WE MAKE ON RUBBER TIRED WHEELS IS BOUND TO INTEREST YOU

We make a SPECIAL WHEEL, tired with ¾-in., ⅞-in., and 1-in. Steel Tire that is a winner.

.. WRITE US ..

Carriage Wheel Supply Co.

UNION CITY - INDIANA

ABSOLUTELY CURED
QUINN'S OINTMENT
 REMOVES
 Trade Mark.

A Watch Free

Every horseshoer has constant opportunity to examine horses and give advice about treatment for blemishes.

Any Blacksmith can make this advice profitable, can make good commission and can get an Ingersoll Watch as an additional premium, by saying a few good words about

Quinn's Ointment

Write at once for full particulars.
 W. B. Eddy & Co., 6 High St. Whitehall, N.Y.



SPECIAL NOTICE.

The American Blacksmith presents free to every person subscribing before July 1, a handsome reproduction in twelve colors of "The Village Smithy," painted expressly for The American Blacksmith, by Raphael Beek.

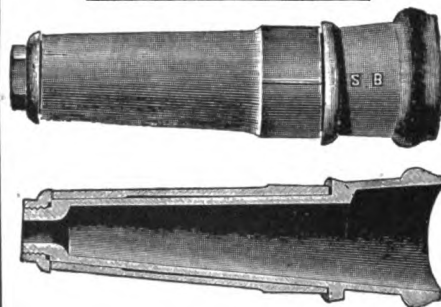
Send a dollar now for a year's subscription with a copy of the picture. The edition is not endless.

As a special inducement for new subscribers, those who send their order during June will receive as a premium, either a Handy Bench Level, or a Farrier's Hoof Knife, in addition to the picture. Send your subscription now before the matter slips your mind.

AMERICAN BLACKSMITH CO., BUFFALO, N. Y.

STUDEBAKER

TRADE CAST THIMBLE SKEIN



IN offering this cast skein to the trade, we do so in the belief that it is the best trade skein on the market.

Bear the following facts distinctly in mind: That there is not an ounce of scrap iron used in its manufacture, but only the very best Lake Superior Iron. The patterns are new and the skeins are interchangeable with standard trade skeins.

Our skeins are moreover cast on end, and are accordingly seamless, symmetrical and well finished.

WRITE FOR CATALOGUE
AND TRADE DISCOUNT

Studebaker Bros. Mfg. Co.
SOUTH BEND, IND.

Horseshoers and Horseowners!

"SURE CURE" is an unfailing remedy for QUITTORS, CORNS, THRUSH and NAILWOUNDS.

PRICE, \$1.00 PER BOTTLE.

PROF. JOHN D. FITZGERALD

4923 COTTAGE GROVE AVE. CHICAGO, ILL.

HORSEMEN, USE DR. TURNBULL'S

CURINE

The Great

American Veterinary Remedy



Formulated by W. A. W. Turnbull, V. M. D., late House Surgeon, Veterinary Hospital University of Pennsylvania.

A SAFE and POSITIVE CURE for Spavin, Splints, Curbs, Ringbone, Bony Growths, Rheumatism

Sprung Knees, Lameness of all kinds, etc.

It is the most Powerful Paint known, and
 SUPERSEDES ALL CAUTERY or FIRING
 NO BLEMISH! NO HAIR GONE!

Its effects are ABSORBENT, ALTERNATIVE, PENETRATIVE and ANTISEPTIC and it will reach the deepest seated trouble. We will WAGER \$500 that one bottle of CURINE will produce better results than any paint, liniment or spavin cure ever made, and we will give \$100.00 for any curable case that it will not cure if used as directed. Every bottle is WARRANTED TO GIVE SATISFACTION! Testimonials from the best horse men in the world. Sold by druggists and harness dealers, or expressed from the manufacturers.

H. S. BOSSART & CO.,

Price { Large Bottles, \$2.00. 305-306 Arnold Bld.
 Small Bottles, \$1.00. PITTSBURG, PA.

Send for our 96 page Little Giant, up-to-date book on the principal diseases of the horse, causes, symptoms and treatment, with testimonials and directions for CURINE. By mail free.

The Best Tops

TOP No. A.

Full enameled drill, good green or blue lining, elm bows. Back and side curtains, colored back drill. Less rail.

\$4.50



The Least Money

TOP No. D.

Full rubber, 24-oz., 8-oz. all-wool lining, back and side curtains, colored back rubber. Hand stitched front and back. Less rail.

\$6.50

SEND FOR THE 1903 "RED BOOK."

Iron, Steel, Carriage and Wagon Hardware, Etc.

Fort Wayne Iron Store Co., 1397 to 1403 Calhoun St., FORT WAYNE, IND.

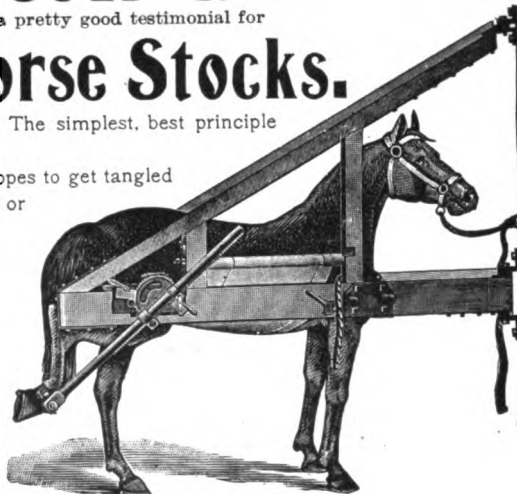
OVER 500 SOLD LAST YEAR!

That's a pretty good testimonial for

Barcus Horse Stocks.

The most easily operated. The simplest, best principle and perfect in every detail.

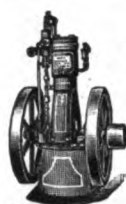
No block and tackle with ropes to get tangled and break. No bracing to roof or floor. The frames being hinged to the wall swing back out of the way when not in use, occupying only a few inches of space. A perfect automatic device to hold the foot perfectly solid in any position desired. Guaranteed not to skin or chafe the foot.



NOT THE CHEAPEST, BUT THE BEST.

CORRESPONDENCE SOLICITED.

GEORGE BARCUS, RENSSELAER, INDIANA.



REGAL GASOLINE ENGINES.

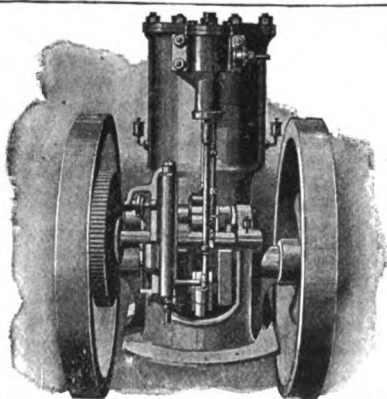
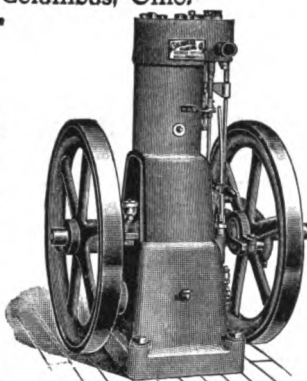
Do you want a reliable engine, one that is high-grade, up-to-date and finely finished? Our specialty is $1\frac{1}{2}$ H. P. to 4 H. P. Just the sizes you want for shop power. Engines are simple and easy to understand. Write us for catalogue "12." It tells about "Regal" Engines.

Regal Gasoline Engine Co.
Coldwater, Michigan.



COLUMBUS GASOLINE ENGINES
ARE THE THINGS FOR BLACKSMITHS
COLUMBUS MACHINE COMPANY
Columbus, Ohio.

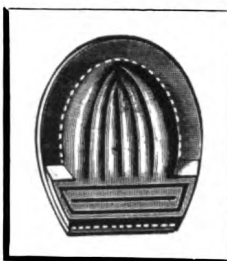
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33
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With the present high living expenses and cost of stock, are you not in favor of higher prices for work? Will you support a movement in your county to raise prices, and also to secure a State Lien Law? Read the Association articles in each issue of THE AMERICAN BLACKSMITH. See page 171.

Fill out and send in the blank below. Send also the names and addresses of every smith in your county, so we can get them interested.

American Association of Blacksmiths, Horseshoers & Wheelwrights,

P. O. Drawer 974, Buffalo, N. Y.

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I enclose \$1.00 in payment of a year's subscription, beginning April, 1903, to THE AMERICAN BLACKSMITH, the official organ of the movement. NOTE.—If you are already a paid subscriber, scratch this out.

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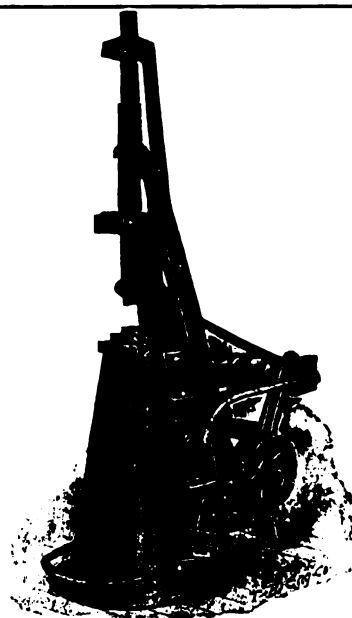
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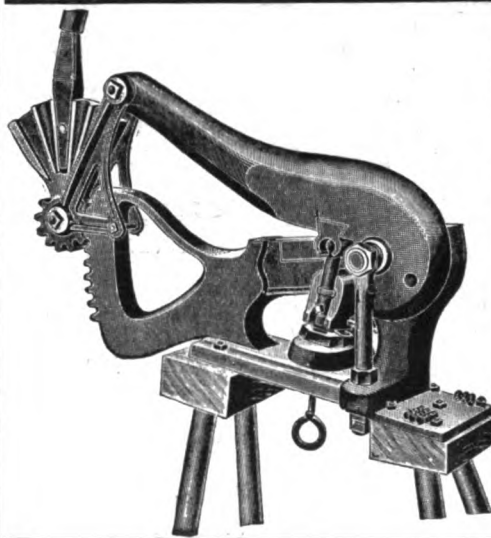
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This tool weighs 250 lbs.,

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It will punch a $\frac{1}{2}$ -in. hole through $\frac{3}{16}$ -in. iron. $\frac{3}{8}$ -in. hole through $\frac{3}{8}$ -in. iron, and is provided with the following sizes of punches:— $\frac{3}{16}$, $\frac{1}{4}$, $\frac{5}{16}$, $\frac{3}{8}$, $\frac{7}{16}$, $\frac{1}{2}$, and these punches are furnished with each machine. It will cut 3 x $\frac{1}{2}$, 4 x $\frac{7}{16}$, 5 x $\frac{3}{8}$ in. cold iron and will cut plow steel. It will cut any size bolt or bar up to $\frac{3}{4}$ -in.

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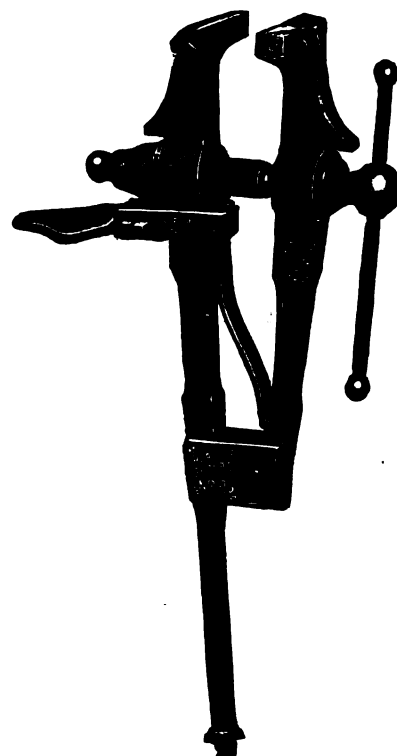
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**HORSESHOERS'
 SOLID BOX VISE.**

THE AMERICAN BLACKSMITH

A PRACTICAL JOURNAL OF BLACKSMITHING.

VOLUME 2

JUNE, 1903

NUMBER 9

BUFFALO, N. Y., U. S. A.

Published Monthly at The Holland Building, 461-465 Washington Street, Buffalo, N. Y., by the
American Blacksmith Company
Incorporated under New York State Laws.

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Subscribers should notify us at once of non-receipt of paper or change of address. In latter case give both old and new address.

Correspondence on all blacksmithing subjects solicited. Invariably give name and address, which will be omitted in publishing if desired. Address all business communications to the "American Blacksmith Company." Matter for reading columns may be addressed to the Editor. Send all mail to P. O. Drawer 974.

Cable address, "BLACKSMITH," Buffalo. Lieber's Code used.

Entered February 12, 1902, as second class mail matter, post office at Buffalo, N. Y. Act of Congress of March 3, 1879.

A New Series of Contributions on the Treatment of Steel.

Having in mind the request of many readers for a clear, comprehensive series of articles upon tool steel and the proper methods of treating it, hardening, tempering, forging and annealing, we have arranged with Mr. Joseph V. Woodworth for a complete treatise upon this most interesting and important subject. As the author points out in the first chapter published in this issue, the position of the tool smith is becoming more responsible, and the demand for competent men greater. Further than this, no smith of any class should be without knowledge of the properties of steel and how to treat it, such knowledge as will be afforded by this series as mentioned, and we are most fortunate in having secured the services of such a practical writer and authority as Mr. Woodworth.

Demand for Shop Pictures.

A picture—there is nothing like it to bring an idea into reality. Pictures of a shop, which present in detail the outside design and the inside arrangement of tools and furniture, are the best object lessons a blacksmith can have on these points. If the arrangement be faulty, he can criticise it to

his satisfaction; if good, he can adopt it. Exchange of ideas leads to competition and is the greatest stimulus to advancement.

We want photographs of well-equipped, up-to-date shops, as examples to be followed, and photographs of tumble-down establishments, illustrating a state of affairs to be avoided. To make it worth while, from a money standpoint, we offer a prize of \$5.00 for the best shop picture and a suitable reward in recognition of the worst in existence. It may not always be easy or convenient to a smith to obtain photographs of his shop, but it is worth a little trouble, if only for future reference, to say nothing of helping along the craft. If you can get an interior or exterior picture of your shop, send it to us this month.

The Competent Boss.

To be a good boss means more than the average man supposes. It is not necessarily the man who knows the most that is chosen for this position, nor is it the domineering man with the loud voice. Not uncommonly one sees a man of great ability who has been at his trade, and even in the same concern, for a score or more of years and is still trudging along near the bottom, while younger, newer men have passed right over his head. Again the man who requires watching really pays for the overseeing himself, and will never come to a position of command.

Promotions are usually given to the men who show a capacity for taking hold and assuming responsibility of their own accord; and from these, "bosses" of departments arise. A boss must be able to handle the men under him, to tactfully lead them to do their best and yield the most for the concern.

A bright, cordial manner and a sense of humor will save many a critical situation. The man who can control himself, and do justice as to his own interests, may be trusted to control others and to mete out justice in cases of others. The man who aspires to

lead and rule, even in a blacksmith shop, should cultivate the virtues of cheerfulness, justice and quiet decision.

A Piece of Good Fortune.

The winning of a prize of any kind is always regarded as "a piece of luck," and the winner as a lucky person. It makes one feel good to know that he, among hundreds, has been first and most successful, no matter how small the prize in view.

We congratulate Mr. John A. Piller, 245 Texas Street, San Francisco, California, as the winner of our \$10.00 subscription prize, competition for which closed May 1st, 1903. Mr. Piller was fortunate in securing twenty-one subscribers to THE AMERICAN BLACKSMITH, —the largest club among those sent in. The contest was a very vigorous one, and all of the many sending smaller clubs received a recompense for their effort.

In a competition of this kind, the winning is not due to luck so much as to determined energy, and hence we take special pleasure in awarding this prize for subscription effort.

An Important Branch of the Craft.

One of the leading factors in the present-day development of the United States is the extension of its shipping. All along our coast line and lake shores new shipping yards are springing into existence, while new lines of steamers are opening up traffic with every remote corner of the globe.

In ship building, as in nearly every other industry, the blacksmith plays a very important part. The ship smith, of course, requires special training and special skill to meet the requirements peculiar to his craft. A really competent ship smith is necessarily a very skilled mechanic, for most of the jobs that present themselves to him require originality as well as mechanical ability. This fact is due to the widely different styles of vessels and the individual opinions of the various ship-owners.

We have secured a few excellent

articles upon this branch of the craft, and we invite other ship smiths to write regarding their work, or to ask questions upon any point of difficulty. Remember that THE AMERICAN BLACKSMITH is for smiths of every class. Also that the demand for good ship smiths is on the increase.

Notes on Covering a Dash.

BY J. F. M.

To cover a dash, lay the dash frame on the leather. Mark and cut $\frac{1}{2}$ inch larger than the frame all around. Lay the frame on again and mark with an awl by punching a hole $\frac{1}{4}$ inch from each corner outside. Punch holes $\frac{3}{8}$ inch from the corners on the inside. Take the frame off and draw lines with a marker or sharp piece of pumice-stone from hole to hole where you are to stitch. Now cut the other side the same size, give one of the pieces a light coat of paste on the flesh side. Lay the two flesh sides together and rub out perfectly smooth. Lay between two smooth boards, say for three hours or until nearly dry. Draw the thread from your sewing machine needle and then perforate the marks all around inside and out. Then pull the two pieces of leather apart, put your frame in as it was when marked. Baste each corner on the outside and sew with two needles all around on the outside first, then finish on the inside.

If you are careful to start in the holes as they were made you will have a dash without a wrinkle or draw. If you start wrong you may spoil the job. For a phaeton or curved dash, lay the frame on the leather, full side up and raise the leather up to the frame while marking.

Ornamental Iron Work.

Gate and railing work forms a goodly part of the house smith's work, and gives scope for creative qualities of a high order. There is something particularly gratifying about a well designed

and skillfully forged gate for instance, due to the combination of solid strength and graceful, pleasing lines.

Photographs and half-tones of good examples of such work are always gladly received for illustration here. The accompanying engraving shows a particularly handsome gate executed at the forge of A. J. Jorss, Washington, D. C., whose iron work is well known to the readers of these pages.

In connection with the above specimen it may be noted how much judgment is required to adapt a design to



SPECIMEN OF ORNAMENTAL GATE WORK.

its special use and surroundings. This gate is massive and somewhat severe in keeping with the stone-work of the archway in which it is hung. The same design would not be suitable for an ordinary residence gate.

How I made a Gasoline Engine out of an Old Steam Engine.

W. L. PAUL.

I took an old steam engine with a cylinder $4\frac{1}{2}$ inches in diameter by 12 inches long, and cut off the steam chest and all other projections except the flanges around the ends. I then

made a foundation by bending a piece of flat iron $\frac{1}{2}$ by 2 inches edge-ways to form a support for the engine. My next step was to take two pieces of flat iron, $\frac{3}{4}$ by 6 inches by 10 inches long, and bend it to fit the outside of the cylinder. Feet were now made to one end, and the other end dovetailed into the flange of the bottom of the cylinder. I bolted the feet to the bed plate or foundation, spreading them far enough apart to allow room for the throw of crank. Turning the engine upside down, I bored four holes through the bed plate and through the bottom flange of the cylinder, put in bolts and screwed them up tight. This gave me a good strong support for my engine cylinder.

The bearings for the crank shaft should be bolted to the bed plate. After forging out my crank shaft of $1\frac{1}{2}$ -inch stock, I put it in place and fitted caps to the journals. I next rebored the cylinder. This I did by turning a piece of hard wood to fit the cylinder and twenty inches long, fitting a cutter or bit about four inches from one end, and turning it through the cylinder, taking a fine cut, just enough to smooth up the worn places. Taking the old piston which was two inches thick, I bolted it to a piece of gaspipe five inches long and $4\frac{1}{2}$ inches in diameter. This gave me a piston six inches

long. I worked the whole down to fit the inside of the cylinder. I cut four grooves for packing rings, bored a one-inch hole through the piston for cross head pin, made connecting rod and connected all together. The connecting rod should be just long enough so that when all is connected and the piston is at top stroke it will have one-third of the cylinder volume for what is called the combustion chamber.

Taking a piece of galvanized sheet iron, I made a jacket to fit water tight around the flanges of the cylinder. Taking the two heads of the steam

engine, I placed them one on top of the other, leaving space enough between the two to allow the water to circulate between, and fitting pieces around the valves and edges to make it water tight. I then bored holes through the bottom,

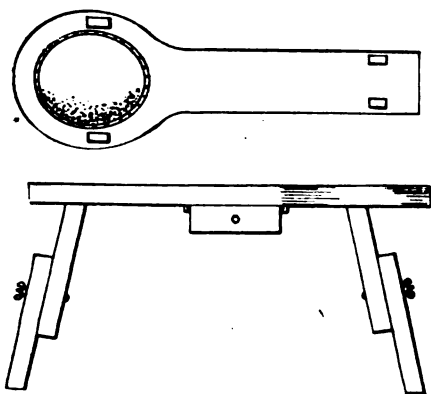


Fig. 9. A VERY CONVENIENT STRIPING BENCH.

1½ inches in diameter, for intake and exhaust valves and through the top opposite the intake and exhaust valves for the stem guides. I also bored a hole through the flange of the cylinder, one through the bottom of the cylinder head to match for water circulation, one through the bottom of jacket and another through the top of cylinder head, thus forming a complete water circulation.

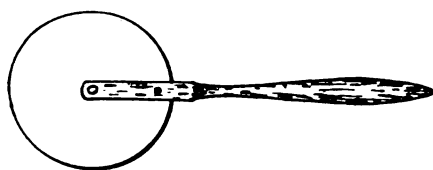


Fig. 10. A GOOD STRIPING PALETTE.

The above will give an idea of how I changed a steam to a gasoline engine. The valves and fittings can be arranged to suit the taste and convenience of the builder. I built the above engine with nothing but a post drill as a helping machine.

Talks to the Jobbing Shop Painter—3.

Striping Bench, Palette, Striping Pencils.
How to Make and Care for Them.
Striping Designs, Etc.

M. C. HILLICK.

The painter located in the country or village paint shop and who necessarily must have a practical knowledge of carriage painting from A to Z, should early learn how to stripe and ornament a vehicle, and particularly how to do rapid and fine line striping. At the present time this accomplishment is indispensable, and the jobbing shop painter unable to do such work is badly

handicapped, to say the least. An artistically striped carriage is not only a good advertisement, but it draws trade directly. Nice, easy striping, moreover, aids to conceal defects in the finish which otherwise might arouse injurious criticism. In the country, carriage users like plenty of striping of an effective sort, and as a matter of business the painter should endeavor to satisfy the demand.

Not long since, the writer heard of a painter doing carriage painting in the country, who, in order to meet the wishes of his patrons, and not being a striper, hired a city painter to cut him stencils and actually stencilled the stripes on. Of course, this does not reflect favorably upon the critical and artistic judgment of the vehicle users of the community, but it certifies to their patience and their capacity for swallowing a bare-faced imposition. The art of striping is an easily acquired one, requiring only study and practice. To assist the painter in the work, a bench or seat will be needed, and as a suggestion for the same we illustrate in Fig. 9 a bench that can be raised and lowered to various heights as the workman may desire. Use 1½-inch poplar for top, shaping it with a swell and cutting out centre for leather seat. Make legs of 1½x1-inch pine, and mortise into the seat securely. Make legs in two sections with a sliding slot and thumb screw adjustment. Underneath attach a box for holding palette, pencils, color cups, tubes, etc. The cut shows plainly the constructive plan of the bench which will be found a handy labor saving device. The device shown in Fig. 10 is a stripers' palette, to be made of ash, cedar or box wood. Attach handle, and with good care the device will last for years.

The pencil equipment is most important of all.

In art stores and paint supply houses one may usually buy sword and dagger pencils, but rarely, if at all, can one get a pencil that will do the work of the shop-made one, if it be skillfully put up. The beginner had best make his pencils in lots of six or more. Then out of this lot he should be able to get at least two high class pencils. It will be impossible to get all good ones. Even the expert pencil maker does not average more than four out of six pencils that may be accounted first class. Buy some swan quill, camel's hair pencils of exceptional quality and from these make the sword pencils. First remove from the quill the desired

quantity of hair. Take the end that is to be tied between the thumb and forefinger of the left hand, and pull the long hairs over to the right, with the thumb and forefinger of the right hand thus exposing the short and objectionable hairs, which should be removed. This removal of the short hairs develops the pencil of one length of stock, not counting, of course, the taper of the

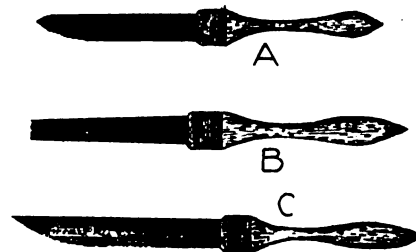


Fig. 11. THREE PENCILS USED IN STRIPING. A, FINE LINER; B, MEDIUM FINE LINER; C, HEAVY OR MEDIUM LINER.

pencil. This selection of stock yields a pencil of greater elasticity, finer poise and hang, and of better durability. The short hair having been weeded out, draw the hair to the proper bevel from one side of the pencil, for fine and heavy lines, as seen in Figs. 11, A, B and C. Then with the thumb and forefinger of the right hand work a little trimmer's paste into the hair inserted into the handle. Cut narrow strips of paper the length of the hair and apply a glaze of paste. Then on each strip of paper lay the hair for a pencil and fold up until the day following, or later. Make the handles from cedar or straight grained white pine. Split in center of handle end, and then from the hair trim the paper and insert the hair carefully in the split. Wind with strong linen thread and tie securely. The

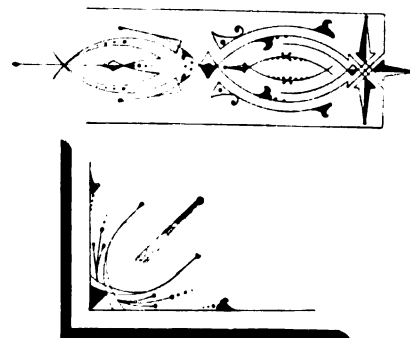


Fig. 12. TWO ORNAMENTAL DESIGNS EXECUTED WITH A SWORD PENCIL.

illustrations will afford the reader an idea of the shape of the pencil handles, winding, insertion of hair and general design. Practice and experiment in making will do the rest.

While a single pencil can be made to

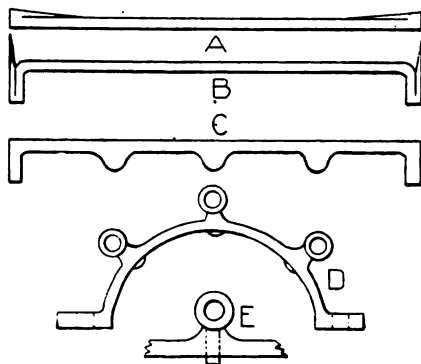
draw lines of various widths from the hair line to the heavy line, it is advisable to make a pencil for a certain line, and no other. A larger assortment of pencils will be needed, but the work can be done more easily and with more uniform excellence. The accompanying illustrations (Fig. 12) of ornamental striping serve as examples of what may be accomplished with the sword pencil. Always keep the pencils in a dust-proof compartment. Flatten the hair out straight on a piece of glass. After using the pencil, wash out thoroughly in turpentine, getting all accumulations from the heel of the pencil. Wipe dry in soft woolen cloths and grease with a mixture composed of three parts mutton tallow and one part sweet oil.

(To be continued.)

A Brief Talk on Ship-smithing Work.

BY BEXTER.

In making a belaying-pin band, 4 by 1½ inches, first draw down the stock and turn over as shown at A. Next, bend the ends as shown at B, and weld down as seen in the figure at C. This welding gives a stubb and square corners with the grain of the iron all in your favor (which is an important item in ship work where strength is required). The next step is to bend to a curve as shown at D. After bending, punch the holes in the cones. Now put in your eye-bolt, as at E, with the end white hot, and rivet up. You can then heat up, pene the scarfs close, take a last heat and clean up the work. You will notice that no jump heats are used in ship work—they should be avoided as much as possible. Shipsmiths do a



A CONVENIENT METHOD OF WELDING EYES ON BELAYING PIN BANDS.

large piece of forging with one ordinary fire because they try to keep their work together.

Eye bolts are sometimes made solid and sometimes welded up to form. A great many are used in ship building when blocks and tackle have to be

made fast at many places on the deck and spars of a ship. A full-rigged ship has a large amount of forged work aloft.

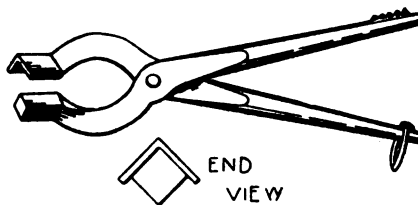
It takes an exceedingly clever iron worker to be a good shipsmith. He must be able to iron off a yacht, or to make all the forgings of a full-rigged trading ship, or even to make any piece of iron work for a first-class man-of-war. Hence a good shipsmith stands in the front rank of metal workers.

A Useful Pair of Tongs for Holding Slip-shares.

S. T. GREIMANN.

The accompanying sketch is to illustrate my device for tongs to hold slip-shares. I have used them for three years, and have proved their utility.

While sharpening a plow slip-share, the ordinary straight tongs will slip and jar loose from the hammering. Some smiths use a kind of handle and brace to bolt on with two ¾ by 1 inch plow bolts, but it takes too much time this



AN INGENIOUS FORM OF SLIP-SHARE TONGS.

way. The bolts will heat and work loose, so that it takes a wrench to keep them tight, especially when an old slip-share is worn at the top of the landside. Sometimes it comes unwelded. My slip-share tongs will hold a bar of lay-steel together so that it cannot jar loose. They will fit any kind, right or left, any size or any make of share and hold it firmly. They are never in the way over the anvil while sharpening or pointing a slip-share, and have the same angle as if a solid bar were bolted on. They never will work loose.

I have seen seven other different devices, made for this purpose, fail, but mine never does. During my apprenticeship of ten years, I studied on a new device for this purpose and I caught the idea of the tongs illustrated. In the sketch the first figure shows the tongs in elevation, the second, an enlarged cross-section at the end of the lips.

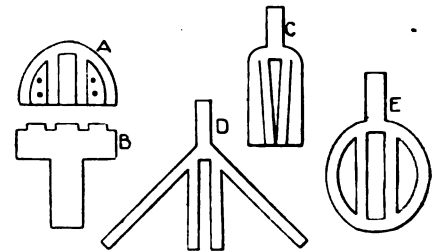
How to Make a Gridiron Step.

JOHN A. SCHULTE.

I have been making gridiron steps in hundreds of different styles for the past thirty years. I occasionally have

an order for an odd step to replace one that is lost or broken, not of my own make. Consequently I am often without a tool to get the proper shape and size. I thought it might interest some of the younger men of the craft to know how one old foggy does it.

I recently had a small oval step to make to replace one lost off a French



PROCESS OF MAKING A GRIDIRON STEP, AND TOOLS USED.

make of cart. The step was 3 by 4 inches inside. The bars were ¾ by 1⅝ inch. I started off by getting up a tool to make it in. I welded a shank for the anvil on a block 3½ inches wide, 1½ inches thick, shaped it half oval, then lightly welded a piece ¾ inch wide, ¾ inch thick, exactly in the center, keeping it back ¼ inch from the front edge as shown at A. Then I shaped two pieces for the sides and riveted them on, leaving full 1⅝ inch between as shown. B shows a side view of the tool.

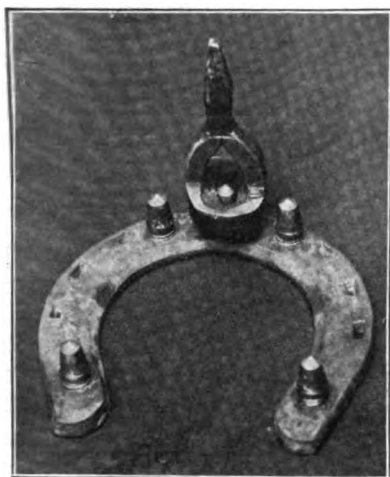
To make the step, I took 1½ by ¾-inch Norway iron, formed a shank, punched a ¾-inch square hole and split the stock as shown at C. Then I opened the strips out, drew out the iron for the frame and bars, set with a small set hammer, between the bars, until they were ¾ of an inch apart, cut off bars to 4½ inches, formed a two-lipped scarf on the end bars, bent around as at E, in the tool, welded the bars and lap of the frame in the tool and the step was done.

Power and Machinery in the Shop.

J. H. SKEELS.

I should like to say a few words on power and machines, as I have been in the blacksmithing business for twenty-one years and have used all kinds of power from a tread power to a gasoline engine. I run an all-round blacksmith shop, doing work all the way from track shoeing to difficult forging. I use gasoline power at present, as I find it to be the most convenient, for it can be started or stopped at any time, thus saving time and expense. Last spring I put in a No. 2 Hawkeye Power Hammer, made by the Hawkeye Manufacturing

Company, Tama, Iowa, which has proved to be the most valuable and useful machine in my shop. It is light running, easy to operate and strikes a hard blow. Last spring I welded one hundred and forty-nine sets of plow shovels, which more than paid for the hammer. It makes plow work a pleas-



A VERY SERVICABLE NEVERSLIP WRENCH.

ure instead of a worry, and I cheerfully recommend this hammer to all brother craftsmen. A drill press is another good machine to help out in busy times, for a lot of drilling in hot weather is a man-killing work. A power blower must be used to force work and save your men. I have a ventilating fan which I find pays for itself twice over every summer. Emery wheels and buffers for polishing make good business in Iowa in the spring time, for Iowa farmers use all kinds of plows. I also wish to call attention to disc sharpening. I have a machine which does its work as fine as silk. I sharpened sixty-nine discs this spring before April first.

A Neverslip Wrench.

ROBERT WERK.

The illustration reproduced here is that of a Neverslip wrench, one of my own make. It is made with an oblong hole and notches or teeth, and is intended to be used with an ordinary brace. It will be found a very serviceable little tool for the calks of the Neverslip Manufacturing Co., New Brunswick, N. J.

Blacksmithing in the Tuskegee Normal and Industrial Institute.

By courtesy of Mr. Booker T. Washington, principal of the above school, we are able to publish an account of the work done in the blacksmithing

department. This institution was established by an act of the Alabama Legislature in 1880 with an appropriation of \$2,000, under the name of the Tuskegee State Normal School. The first session was held in a rented shanty-church with thirty pupils in attendance and one teacher.

The object of the school was and still is, to give a thorough moral, physical, literary and industrial training to young colored people. This object appealed so strongly to the public that during the first session the present location, consisting at that time of one hundred acres with three small buildings, was purchased by Northern friends. By Act of Congress in 1890, a tract of 25,000 acres of mineral land valued at \$125,000, was given to the institution. The present endowment is thus about \$400,000, or including property and equipment, in the neighborhood of \$800,000. The institution is well situated about a mile from the town of Tuskegee, and comprises over a score of well-appointed, up-to-date buildings, devoted to the purposes of dormitories, training halls, libraries, trades buildings, etc. The course is so arranged that no student can obtain a literary education without learning at the same time a suitable trade, and the expenses are

taught to clean the shop properly and to make fires. They learn the names and sizes of tools with the care of them and their places; and also to practice economy in the use of material. They also study the formation of iron and steel and the different kinds and grades of each; the various modes of welding and the use of sand and welding compounds; how to weld and set tires and axles; measurements of track of axles; dish of new wheels; making clips, nuts, trace-ends, and putting work together. The bench work comprises filing, clipping, jointing and fancy work, with the use of emery and sand paper. In fact, every branch of the trade is considered. Essays are written and monthly examinations held on all topics.

During the second year, the main training is in horseshoeing. The preliminary instruction consists in the condition of the shoeing floor, and how to make a shoer's fire; the names and sizes of tools; how to make a mould; also how to strike on a shoe; the names and sizes of shoes and nails; how to file a shoe, and how to pull off an old shoe. Special lessons are given in fitting shoes to horses with different gaits and differently shaped feet. In this year instruction is given in the making of tools, also fender work, dash and rail

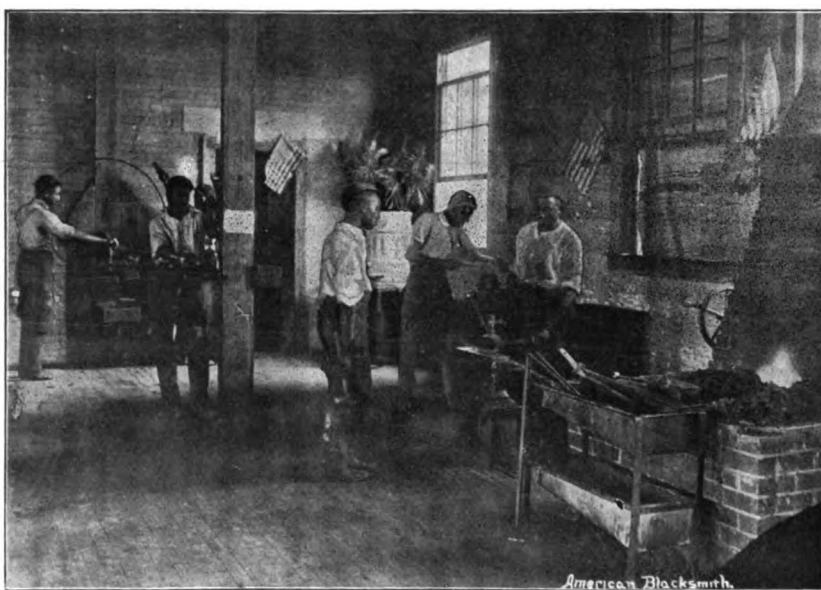


Fig. 1. A BUSY CORNER IN THE TUSKEGEE SHOP.

placed so low that tuition is easily within the reach of every young, able-bodied, intelligent and industrious colored man or woman.

The blacksmithing course (the subject of interest to our readers) is very complete and extends over two years. During the first year, the boys are

work and tempering. Carriage work with the repairing of wagons and buggies and estimating costs of jobs are all handled in the second year, and at the end of each month, examinations are held as in the first year. Lectures are given daily. Thus at the end of his course the student is thoroughly

informed in both the practice and the theory of his craft.

In every branch of the mechanical department are introduced what are termed Industrial or Theory classes.

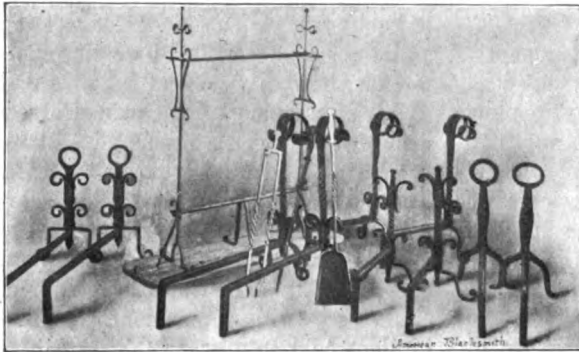


Fig. 2. SOME WORK OF THE TUSKEGEE BLACKSMITHS.

These classes are held every afternoon except Saturdays, and last forty minutes. Problems are discussed and any work of the day that has presented special difficulty, receives attention. The principles of the trade and the materials with which the students work are taken up and studied.

In the horseshoeing department a horse's hoof and leg, properly mounted and capable of being dissected, is kept in the shop to enable the students to study the anatomy of the horse's hoof and leg and how the different diseases

made to bear directly upon the shop practice. The pity is that all our horse-shoers have not these advantages.

Another point emphasized at Tuskegee is the preparation of mechanical drawings. All work done by students in the blacksmith and carriage building departments is from drawings. Sometimes these are prepared in the regular drawing department and sometimes by the student making the article. This practice gives the boys an intricate and detailed conception of what they are about to do and the proper relation of parts. Besides blacksmithing proper, a

similar training is afforded in the allied branches of wheel-wrighting (a three years' course in this), harness making, and carriage trimming and painting.

The engravings published herewith are from photos furnished by the Institute. The first is of a corner in the blacksmith shop, showing the forge in operation and several of the students at work. The second engraving illustrates a collection of andirons, shovels, tongs, and other fireside utensils. The third represents a couple of covered wagons made by the students for use

The object of the Institution is so good and the work has been so efficient that its influence must tell beneficially upon the colored population of the "Sunny South."

The Gas Engine of Quality.

BILLY BUNTZ.

The superiority of the gas engine over other powers for the smithy is well established, yet when contemplating



Fig. 3. WAGONS MADE BY THE TUSKEGEE BOYS.

the purchase of one, the smith, bewildered by glowing descriptions, exclaims: "Each company claims to have the best."

A conclusion of this kind usually prompts a blind purchase, as shown by the experience of the smith of whom the following story is told:

"Slim's engine, being \$50 cheaper,"

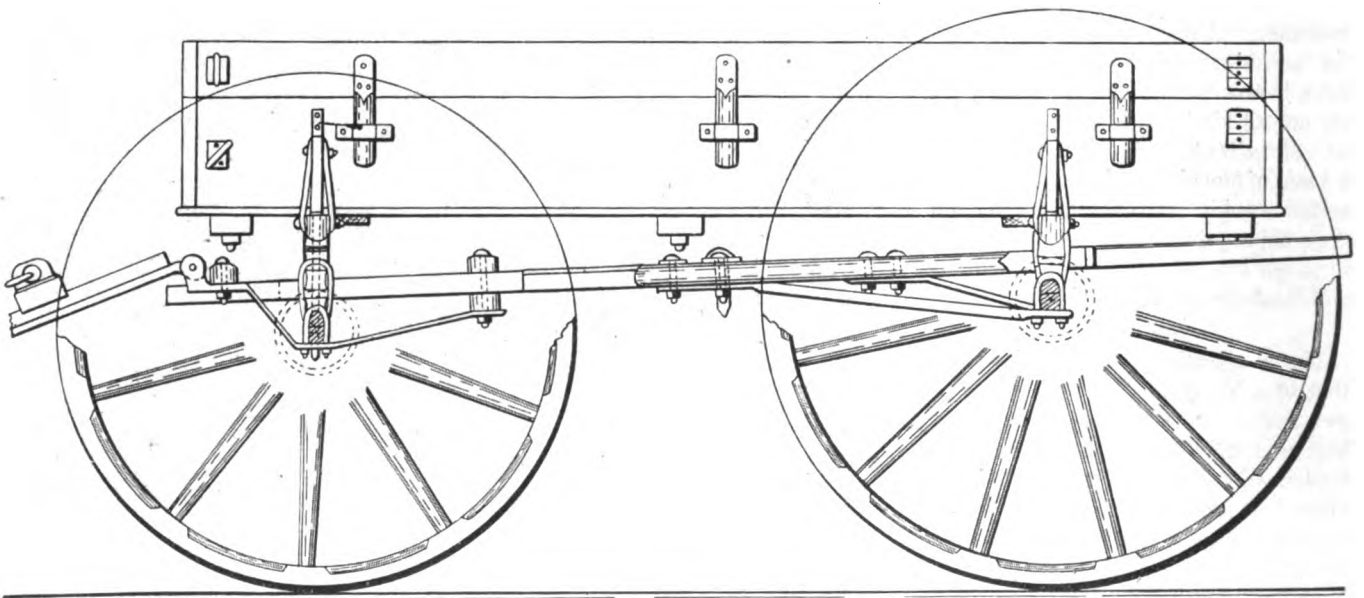


Fig. 4. PLAN OF A WAGON, FROM A BLUE-PRINT MADE IN THE DRAUGHTING DEPARTMENT AT TUSKEGEE.

affect the various parts. The benefit arising from such classes must be apparent, for thus are connected the theoretical and the practical sides of science. The academic work in such subjects as chemistry and physics is

in the establishment. The fourth is a reproduction of the blue print of a wagon plan made at Tuskegee. Fig. 5 shows the Slater Armstrong Memorial Building, and Fig. 6 the Boys' Trades Building, both fine structures.

the smith contended, "will save me just that much money."

After trial, however, it proved to be a poor runner, and he thereupon visited Red Top where the engine was built.

"Where is the engine works?" he

inquired, upon his arrival there.

"Right here," answered a boy, pointing across the railroad track.

"I can't see it."

"Can't expect to see through a box car; the shop is on the other side."

Some so-called factories cannot even be seen. They exist only for a short time, then go out of business, leaving customers with a cheaply constructed engine and no place to get a repair part. It is easy to make a difference of \$50 or \$100 in prices. Engines, like watches, are to be had in all grades.

The supremacy of one engine over another is in its quality. To design an engine along conservative lines requires experienced workmen, expert in the gas engine business, and to construct an engine of this kind requires the very best materials. That the smith may not grope entirely in the dark in making a selection, a few points of excellence are here cited.

The cylinder should be of a high-grade gray iron of close texture, with internal apertures for the flow of water or oil in keeping it cool. Where water is used the cylinder must be drained in cold

The piston should have metallic spring rings, so that all wear will be on the rings and not on the cylinder or the piston. When worn out these rings may be renewed at slight expense. Connecting rod and crank should be very strong, as they are subjected to the hardest service. The best cranks are drilled or cut out of a solid block of

that one of that kind will do the same for other folk. There is more satisfaction in buying in this way than by obtaining prices from a dozen engine companies and then buying from the company that sells the cheapest, gives the longest time on payments, or gives a guarantee as lengthy as the pedigree of a thoroughbred horse.

Where the shop is large or considerable power is required, it should be borne in mind that an engine of five or ten horsepower costs little more than a small one.

Quality, not prices or terms, ought to govern in buying an engine. A good engine speaks for itself, and, like a thing of beauty, is a joy forever; while a cheaply constructed engine is worse than a nightmare.

ed engine is worse than a nightmare.

Attention to Detail.

THOMAS BEASLEY.

There is a certain class of blacksmiths that seem to think, since machinery is used to the extent it is at present, that they should slight their work because it is to be machined after they are done with the job. I don't wonder at the slurs that are



Fig. 5. THE SLATER-ARMSTRONG MEMORIAL BUILDING AT TUSKEGEE.

steel, without any welds or bends.

The engine of quality is of the four-cycle type and has electric ignition. An engine of this kind costs more than a two-cycle engine with hot tube ignition, but gives the best service in the long run.

There is perhaps nothing so provoking as a cheaply constructed gas engine which "bucks" every day or two by reason of the working parts having been

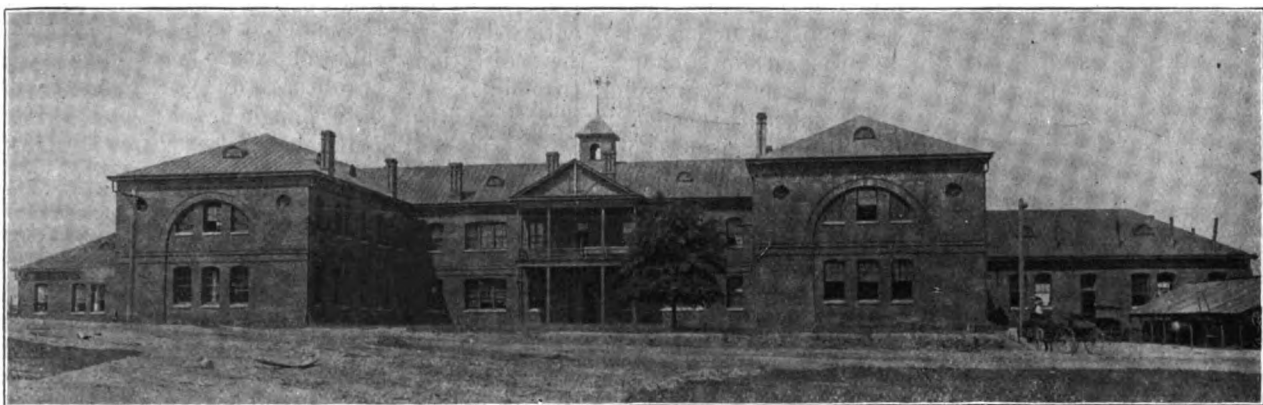


Fig. 6. VIEW OF ANOTHER PORTION OF THE SCHOOL—THE BOYS' TRADES BUILDING.

weather, else it will freeze, while with an oil-cooled engine there is no danger in this direction. No water supply is needed with cylinders which are oil-cooled. The cylinder-head should be separate and should also be water-jacketed or oil-jacketed like the cylinder itself in every case.

inaccurately figured by the manufacturer. An engine of this kind is as troublesome as an old blind horse.

Before buying an engine it is well to visit shops that are driven by one. If an engine of certain build has been rendering good service for a brother smith for a number of years, it is likely

often thrown at our trade by men who have to finish up work done by smiths too lazy or slovenly to finish their work as it should be.

Such workmen are usually ill-paid for their services, and how can it be otherwise when they take no pride in their work either as to quality or

quantity? In my estimation there is nothing more pleasing to the eye than a neat painstaking job of forging, and when you show me a man that is particular with his work, I will show you a man who is a credit to his community and commands the best of wages.

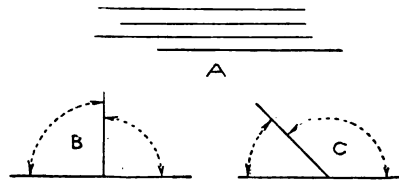


Fig. 4. PARALLEL AND INTERSECTING LINES.

Some trades are learned in a year, while others take longer to become expert in, but from my twenty-five years' experience at blacksmithing I can truthfully say that there is hardly a day while working at the forge, but what I learn something new and useful to be stored in my brain pan for future emergencies.

The trouble with most smiths in this "rapid" age is that they lose sight of the little things connected with their work and keep only the big things before them. For instance, they may need several tools on one heat, but never think to lay these tools out convenient to their hand, and in the order they are needed, but wait

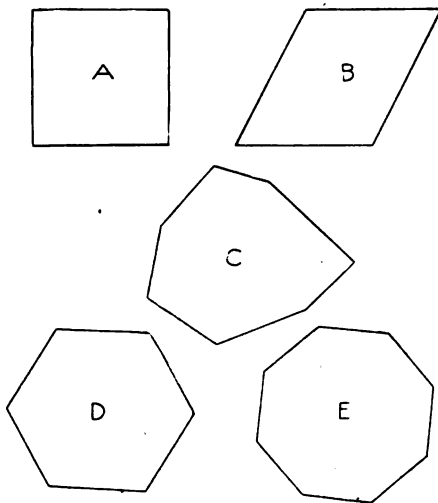


Fig. 5. RECTILINEAR FIGURES OF DIFFERENT FORMS.

until the heat is on the anvil, and then have to look over all their tools before finding the right one. I have seen men run all over the shop to borrow a needed tool or perhaps have to grind a chisel before the work could be finished as it should be. Time, tide and a blacksmith's heat wait for no man. Have a place for everything and everything in its proper place;

then you will not be the laughing stock of your shop mates or perhaps working for less wages than those who pay proper attention to detail.

The Elementary Principles of Mechanical Drawing.—2.

The Simple Geometrical Figures and Terms.

To any man desiring to clearly represent a tool or piece of work or even to accurately understand the tool itself upon paper, some knowledge of the common geometrical forms and terms is of the greatest value. The uninformed person may, for instance, call anything with four sides a "square," or any figure having a round form, a "circle." He can seldom tell you what is meant by a triangle, a hexagon, rectangle or ellipse. And so many mechanical contrivances involve these figures that some understanding of them will solve many a problem for the reader of mechanical drawings.

The first principle of geometry is the point. A point is, of course, merely position in space. It has no parts and no size (or magnitude, as geometry names it). A point is marked, in drawing, by a small dot.

The line is the second principle. A line is simply length without breadth. In drawing a line, of course the ink gives it width, but a true line has none. The edge of a knife will illustrate a line. Lines may be straight, curved or crooked. A straight line is one that does not change in direction throughout its entire length. Curved lines change their direction regularly from point to point. A crooked line changes its direction without system or regularity.

The surface comes next to the line. A surface has length and breadth but no thickness. A plane surface is a perfectly flat one, or one in which a straight line passing from any one point to any other point in it, always lies in the plane surface. For instance, place the edge of a rule upon a polished slab of stone, and it will touch the stone throughout the length of the rule. But lay the same rule upon the surface of a block of rough stone and it will touch only the projecting places. The polished slab has a plane surface, the rough one has not.

A solid has length, breadth and thickness. Right here, may be noted the meaning of the word dimension. A point has no dimensions. A line

has one,—namely length. A surface has two,—length and breadth. A solid has three dimensions—length, breadth and thickness. Solids are regular or irregular. Regular solids have all their surfaces the same shape and of equal size, such as the cube, whose six sides are all equal squares.

Facts About Lines and Rectilinear Figures.

When the direct or shortest distance between two lines continues the same throughout their length, the lines are said to be parallel (Fig. 4, A). Any number of lines may be all parallel to one another, as the lines on a sheet of foolscap paper.

When lines are not parallel they will cross each other. It may be noted that parallel lines can never be

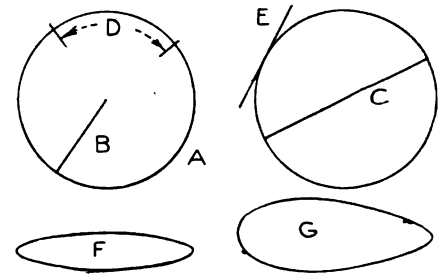


Fig. 6. CURVILINEAR FIGURES AND LINES RELATING TO THE CIRCLE.

made to cut one another, no matter how far they be drawn in either direction. When two lines meet or cut one another they form angles. If one cuts the other in such a way as to make the adjacent angles equal, the lines are perpendicular (See Fig. 4, B) and the angles are right angles. When they are not equal, the lesser angle is said to be acute (sharp) and the greater obtuse (dull). An acute and an obtuse angle are shown at C, Fig. 4.

It takes at least three straight lines to enclose a space. Hence, no figure can have fewer than three sides. The three-sided figure is called a triangle—meaning three-angled. It will plainly appear that since the sides of a figure all join forming angles, there will be as many angles as sides. Triangles are of various kinds. The triangle whose three sides are all equal is called equilateral. One having two sides equal and the third unequal is said to be isosceles. If the three sides are all unequal the triangle is scalene. When one of the angles is a right angle, the triangle is said to be a right-angled triangle.

A four-sided figure has also four angles, and any four-sided figure is a quadrilateral or quadrangle. When

the angles are all right angles, the figure is called a rectangle. All rectangles have their opposite sides parallel to each other. A rectangle whose four sides are equal to one another is a square (Fig. 5, A). When the angles are not all right angles, we have a diamond or rhombus, as shown at B, Fig. 5, instead of a square. Any figure of more than four sides is

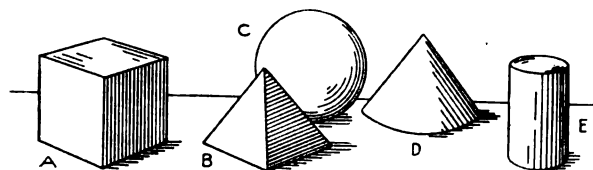


Fig. 7. A GROUP OF THE MOST COMMON SOLIDS.

called a polygon (See Fig. 5, C). The hexagon has its six sides all equal and its six angles all equal. Fig. 5, D, shows a hexagon. So with the octagon—eight sides equal and eight angles equal, as shown at E, Fig. 5. The total distance around any figure is its perimeter. The line passing from the boundary of one side through the center and terminating at the opposite side is called a diameter. The distance from angle to angle through the center is the diagonal.

Curvilinear Figures.

The circle is the principal curvilinear figure. A circle is a plane figure bounded by a curved line, called the circumference (A, Fig. 6). All the lines, radii (one alone is called a radius, see Fig. 6, B), drawn from the center to the circumference are equal to one another. A line drawn through the center of a circle to the circumference at either end, is called a dia-

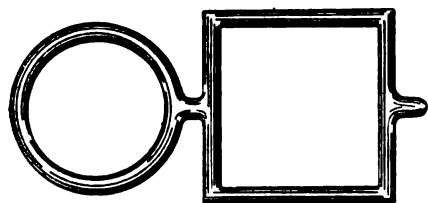


Fig. 1. DOUBLE WITHE FOR MAIN MAST AND TOP MAST OF SCHOONER.

meter, as seen at C, Fig. 6. Any portion of the circumference of a circle is an arc (Fig. 6, D). A continuous straight line that touches a circle without cutting it is called a tangent to the circle. E, Fig. 6 is tangent to the circle.

Two or more circles drawn about the same center are called concentric. When they have not the same center they are eccentric. The other

ordinary curvilinear figures are: the ellipse and the oval. The ellipse is peculiar. The best way to understand it is to draw one. To do this take a string, two pins and a pencil. Placing the pins a short distance apart, join the string to form a loop. Place this around the pins loosely enough to admit of inserting the point of the pencil to draw the string out a little. Holding the pencil vertically, pass it around with the loop of the string from one point to the other, then the other side the same, and the line traced will be an ellipse. This is illustrated at F, Fig. 6. An oval is

an egg-shaped figure: i.e., it has one end smaller than the other (See G, Fig. 6).

Solids.

Solids are either regular or irregular. The most common regular solids are as follows: The cube (See Fig. 7, A) which has six sides, each being a square; the pyramid, (seen at B), the sphere, at C, the cone, D, and the cylinder as shown at E.

A good idea of the forms of these solids may be obtained by placing the figure upon a paper and drawing a pencil around the base, then turning carefully so that an adjoining surface may be similarly outlined. Then the solid may be turned until all the surfaces have been drawn round, and the result will be a pattern of the figure. The sphere, however, cannot be represented in pattern.

In concluding, a few words of ordinary occurrence may be defined.

To bisect means to divide into two equal portions. To trisect means to divide into three equal parts. Angles as well as lines, surfaces and solids may be bisected and trisected.

(To be continued.)

Iron Work for Schooner Masts and Spars.

W. L. PAUL.

For a schooner, say of twenty or twenty-five tons burden, we take stock $\frac{1}{4}$ by 2 inches to form a wither for mainmast head and topmast, which is a double wither, as shown at Fig. 1. This would be about seven inches inside for the mast head and six inches for the topmast. Take two pieces of the same length and lay them flat sides together, putting a collar or ring of $\frac{3}{4}$ -inch round stock around both pieces as shown at Fig.

2, A. Place in the fire, take a good welding heat where the collar is placed, weld all together, and with the same heat spread the ends as

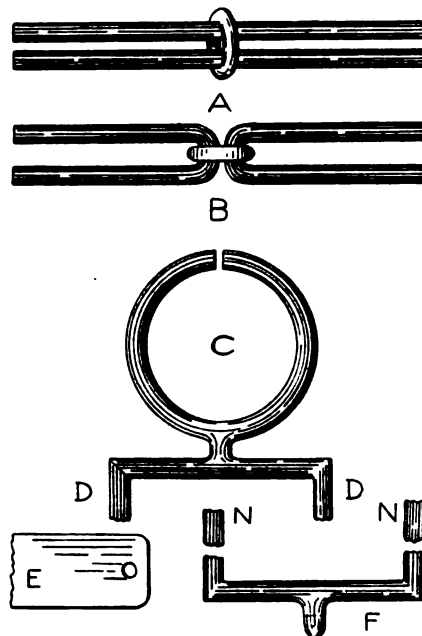


Fig. 2. PROCESS OF FORMING WITHE.

shown at B. Heat and form wither for topmast as shown at Fig. 2, C. Next weld the ends together. Now lay off and bend the ends as at DD. Bend a piece of the same size stock in the middle, flat sides together, taking a heat and welding about two inches of the end together. Punch a hole half an inch from the end, and round up on the horn of the anvil, like Fig. 2, E. After taking a good heat, put it in the vise, eye down, bend like Fig. 2, F, turning up ends N N. Scarf and weld as in Fig. 2, C, and your

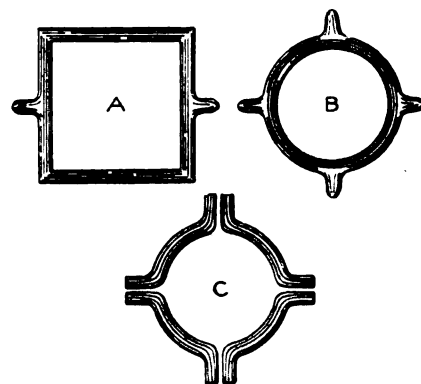


Fig. 3. WITHE FOR FOREMAST AND BOWSPRIT.

wither is complete as shown in Fig. 1.

Fig. 3, A is the foremast wither, and is formed in halves like Fig. 2, F. Fig. 3, B is for the bowsprit and spars, and is formed as in Fig. 3, C with the ends welded together, holes punched and worked round on the horn of the anvil which completes it.

The Builders.

LONGFELLOW.

All are architects of Fate
Working in these walls of time;
Some with massive deeds and great
Some with ornaments of rhyme.

Nothing useless is or low,
Each thing in its place is best,
And what seems but idle show
Strengthens and supports the rest.

For the structure that we raise
Time is with materials filled.
Our to-days and yesterday
Are the blocks with which we build.

Truly shape and fashion these,
Leave no yawning gaps between;
Think not, because no man sees
Such things will remain unseen.

In the elder days of art
Builders wrought with greatest care
Each minute and unseen part,
For the gods see everywhere.

Let us do our work as well
Both the unseen and the seen;
Make the house, where gods may dwell,
Beautiful, entire and clean.

Else our lives are incomplete
Standing in these walls of Time,
Broken stairways where the feet
Stumble as they seek to climb.

Build today, then, strong and sure,
With a firm and ample base;
And ascending and secure
Shall tomorrow find its place.

Thus alone can we attain
To those turrets where the eye
Sees the world as one vast plain
And one boundless reach of sky.



Looking ahead to midsummer trade?

Are you posted on styles for summer carriage painting?

Up with the lark is the rule of the energetic smith these summer mornings.

June—the summer opening season. Has it commenced well with you? Push the trade.

A new blacksmith shop will be put up by the Locomotive & Machine Company, of Montreal, Quebec.

No work is done well unless the workman's heart is in it and his mind attracted to it, work as hard as he may.

Have you benefited by any of the improvements that have come into the mechanical world since last June?

Pray remember that somebody is just waiting to answer that question that is bothering you. Send it in.

Good times continue and promise to continue in spite of the gloomy forebodings of a worthy contemporary of recent date.

Keep in touch with the craft. Your shop may be in the backwoods, but that is no reason why your ideas and methods should be, too. Keep up to date.

Think a minute! A clear idea of just what you want to do and how you are going to do it will save many a mistake and much waste of time and fire.

The University of Colorado, situated at Boulder, Col. (H. C. Crouch, M. E.), will add six or more new fires to their manual training blacksmith shop.

Business attracts business. Keep busy and full of energy if you would draw custom. Let your efforts flag ever so little and you will be rated a sinking ship.

A really successful business man must necessarily understand human nature. A little tact and management will often win and retain the most fastidious customer.

Necessity is the mother of invention; but it takes brains—and working brains at that, to feed and clothe and mature the invention. Necessity alone will not do this.

Wisdom, 'tis said, is experience turned to account. Even failures and loss of time are profitable to the wideawake man who has the brains to investigate a failure and trace its cause.

A rainy day comes as a pleasant break occasionally—if you have the proverbial something laid up for it. The man whose accounts lie uncollected cannot hope to find it very cheerful, however.

The University of Pennsylvania has just completed plans for a fine new engineering building, which will include among other laboratories on the first floor a well-equipped forge and iron working shop.

Some people spend the whole summer wishing for snow; and pine away the winter in dreams of leafy trees. The wise man makes the best of things as they are, and is surprised at how good that best turns out to be. There are two points of view.

A cheerful boss is a stimulus to his workmen. Not only the encouragement he may give in words, but the example he sets and the very effect of his presence helps to make the hours pass and the work get done quickly. Good temper is a habit.

Ten minutes today—ten minutes tomorrow and ten minutes every day—that makes an hour at the end of a week. Great deeds have been accomplished and great ideas formed in less than an hour. Hence, do not waste the minutes.

A substantial evidence of appreciation is an unasked increase of wages. Give the apprentice such wages as will make him respect himself and the work he is doing, and not feel like a "cheap John."

Talking things over with fellow craftsmen is of the utmost benefit to the blacksmith, as to other trades and professions. Why not? The yearly increase in the popularity of conventions and meetings testifies to the value of this.

The race track has done much to promote the science of horseshoeing in America. Trotting is an artificial gait, and trotters are therefore subject to many artificial diseases. In treating these, the American horseshoer becomes very expert.

A legacy of prejudice is what many of us have to contend with; and it sometimes takes a lifetime to outgrow the antiquated notions instilled in us in childhood. More reason for fighting down the old and striving after the new when worthy.

The shop, where the workman spends almost all his waking hours, is surely worth keeping bright and attractive. The effects of a little care in this direction will show in

the temper, the morals and the work of every smith engaged therein.

For painttaking work, does the American smith favorably compare with him of the old country? If so, why can the British mechanic, not only make a living, but grow rich while using old, out-of-date tools that the average American blacksmith could do nothing with? Why is it?

Who is to blame if a smith does not read up-to-date literature? Himself. In these days when books and magazines of every style and description are easily within the reach of all, even the poorest, most illiterate man can afford and obtain exactly the literature he needs. There is no excuse.

Horseshoes are at a premium in the Philippines. The natives take all the shoes they can get hold of to make over into spear and arrow-heads. Hence, the "shoemaking stands," where shoes are made by American machinery, are always crowded with horses, mostly cavalry horses, waiting to be shod by the farrier.

Perseverance is a very powerful factor in the history of every achievement. A Buffalo blacksmith relates how he succeeded, after a period of six months of repeated trial, in curing a horse of "Skelping." During that time he had tried one method after another without benefit, when a final trial brought the desired result and the horse went right.

A clever pamphlet has recently been published, emphasizing the joy of work. The true pleasure of toiling for a living, of feeling that you have earned what you get, the healthful weariness and the sound sleep, the hearty appetite and the wholesome fare, and above all, the freedom from the care of a large fortune—these are blessings that few workmen know how to appreciate.

Jack's a dull boy, when all work and no play is the rule. The blacksmith is no exception to the rule. It is the duty of every man to take some recreation every day. If his work be manual, let him spend some time each day in reading, writing or other diversion not of a physical nature. He returns to his craft abler, brighter and better satisfied with life, and time thus spent will be more than repaid.

America ranks first among the nations for inventiveness, and Connecticut first among the States. Second on the list stands Great Britain, and third, Germany. The German Emperor recently paid tribute to an American inventor, Mr. John Arbuckle, of New York, by personally dictating a letter thanking him for a device to extricate stranded vessels, and expressing interest in the American's invention.

Management, not extent of business, makes the difference in the profits of a concern. A certain manufacturer found upon looking into his affairs that he was handling \$500,000 worth more business than the year before, but his feeling of increased wealth disappeared when investigation at the year's end proved that his profits had increased just \$8.08. Good management is an essential to any business, large or small.

What's that? we asked Tom Tardy. He was looking over a stack of torn and dirty papers that he had collected from various nooks and corners of the shop.

"Them's my memos," he replied, throwing out bits of newspapers and wrapping paper as he sorted them. "And I'm blest if I know which is which. Here's a bill of five dollars, but—can you make out whether Brown owes it to me or me to Brown?—I can't just remember like. I'll have to ask Brown." Then he went on examining others. This is Tom's way of balancing up his books. We do not recommend it.

American Association of Blacksmiths and Horseshoers.

Excellent reports of progress come from many quarters. No mistake has been made in thinking the time is ripe for the blacksmiths, horseshoers and wheelwrights to organize in every county of the land where not already banded together for common interest, nor has any mistake been made in thinking that practical working associations can be formed to bring immense benefits to their members. The first thing necessary is for every man to lay aside every particle of prejudice and to co-operate with his brothers and neighbors. Pull together instead of apart.

In its recent experience the Association has learned of men who were actually resetting and shoeing for eight and fifteen cents, and in the rich State of New York, too. Think of it! On the other hand, craftsmen have told how raises in prices from 25 to 30 cents on each shoe brought them \$300 and over extra each year. Figure it out yourself and see what it would mean. Then again take a county with one hundred shops. If each shod on an average of but five horses a day, a raise of five cents a shoe means a total of \$30,000 a year divided among the smiths of that county. There's food for thought and a spur to action! It is only our just dues, too, for isn't the farmer, the hardware dealer and everyone we buy from, charging higher prices, more than ever? The country was never richer and more prosperous than it is to-day. Shouldn't the blacksmith, upon whose skill so many depend, feel some benefit from this prosperity instead of getting poorer every day? One smith told his wife that at the present price of stock, the more work he did the poorer he got. And this is not so far from the truth either. The low prices seem to be one reason why so many smiths are going out of the business.

This should not be, for there is no mechanic who works harder with head and hands, or in more trying situations, to earn a living for himself and his own, than the blacksmith.

The Association named at the head of this article was incorporated under New York State laws, to carry out all possible reforms and benefits for the craft. Already efforts are under way to secure Lien Laws in our States so that the craftsmen can always be able

to use as security for payment the animal or vehicle worked upon, and that too without holding the article in his shop. Liens of this kind are filed, and do not become void by the sale of the article any more than do mortgages upon property. Laws of this kind exist in but few states and should be in force in all. This Association proposes to procure them for the craft if it possibly can be done, and prospects are very bright.

As to prices, the American Association has the authority to grant charters to branch county associations, and to provide plans for their formation and regulation. This Association has a number of representatives at work forming branches, but as it would require a small army to cover every state, we desire to hear from interested smiths in every part of the

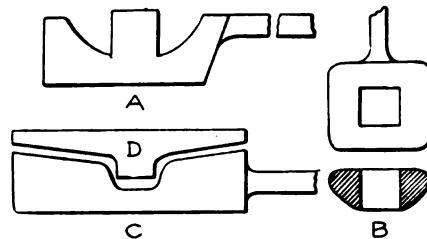


Fig. 35. TOOLS AND PROCESS OF FORGING YOKE ENDS.

country, who will take hold of the work in their own home county. By our plans they would be repaid for the time taken from their shop. The Association will gladly give the benefit of its past experience to any interested craftsmen. Literally bushels of letters have come from all sections and a great many branches are being formed. Bear in mind that the American Association does not fix the prices—these are agreed upon by each branch itself after organizing.

The American Association simply furnishes charters and all necessary literature, and gives its help in every possible way.

All who are interested should address the American Association of Blacksmiths, Horseshoers and Wheelwrights at P. O. Drawer 974, Buffalo, N. Y., for plans and information. State what county you are in and how many shops it contains.

Local Items.

The Livingston (N. Y.) Branch of this Association was organized at Mt. Morris, N. Y., May 14, the following officers being duly elected: President, W. E. Cole, Avon; Vice-President, Wm. Mate, Mt. Morris; Secretary, A.

C. Palmer, Dansville; and Treasurer, M. J. Scully, Geneseo, N. Y. The meeting was a most enthusiastic one, and adjourned to meet May 30th at Livonia, at 3:30 p. m.

Meetings will be held at early dates in Genesee, Chautauqua and Monroe counties, New York State.

The Railroad Blacksmith Shop.—8.

Making a Valve Yoke.

W. B. REID.

Opinions as to the best and most economical manner of making valve yokes will naturally differ. The result of years of practical experience suggests the following:

First Method: In railroad or contract shops, with suitable heating furnaces and appliances, where valve yokes are made in quantities, the following is practicable. Cut old car axles into pieces long enough to upset into ingots of sufficient size for yoke back required. Charge furnace with these (from ten to fifteen pieces) according to capacity.

Porter bars are heated in smith fire to apply to ingots as they are successively brought from the furnace to hammer. Draw the ingot down quickly to proper proportion and check down part for stem with triangular fuller as at A, Fig. 35. This can be done more quickly by checking down both sides at once by using two fullers, or one made in double form, B, Fig. 35.

Draw down both ends quickly, imparting proper taper in tool, C, Fig. 35. This tool is left open across as shown, for quick manipulation, and because it does not readily form cold-shuts at the base of stem. It has the further advantage of keeping the iron compactly together in uniform mass, thereby preventing a defect at base of stem peculiar to second method of manufacture, to be described in the next article. This operation completes the piece in one heat, as at D, Fig. 35, and should be done so expertly as to be laid down while still almost at a white heat—and as smooth as silk. In this way ten or fifteen pieces can be forged in a very short time.

The other half of yoke may be made of bar or forged iron, preferably forged to preserve uniform quality of material in yoke. Subsequent operations take place at anvil. With a welding heat, round and draw down the short stem to proper size. Draw down ends and bend same over anvil or former, A, Fig. 36. Driving the iron downwards with a fuller as shown, prevents

cold-shuts inside of corners. Scarf the parts, splice fashion, clamp together and weld from sides, B, Fig. 36. The top plate of clamp made with a hole for stem, C, Fig. 36, permits the placing of clamp at center of yoke. The welding of stem carefully either by lap or splice scarves, completes the job.

The stem should be made of good hammered iron in preference to rolled iron of any kind. The manner of forging the back of yoke, as just described, is not regarded with favor by many writers. The cross grain of iron in stem is the theoretical objection urged, an objection which practical experience very often largely discounts. Forged as we have described, an approximately perfect, homogeneous piece of iron should be the result; leaving little if any trace of cross grain at any point.

The same objection and answer is applicable to a large variety of forgings made in the same way, such as motion links, motion link hangers, etc., having equal, if not more, strain to encounter than valve yokes.

The cause of such imperfections is more generally due to careless, slovenly manipulation by the smith or forger, loosening and shattering the fibre of the iron by hammering the same when too cold. In shops where an occasional yoke back has to be forged at an ordinary smith fire, the writer would not recommend this method. In this case several heats would probably be required to finish the piece, which would not produce that solidity which forging the piece in the mass at one heat ensures.

(To be continued.)

Kinks and Conveniences in the Wagon Shop—3.

BY D. W. M.

Plan and Arrangement of Shop and Office.

The arrangement of the shop has everything to do with convenience in handling goods. There are many excellent plans in common use, the principal being the square, the L-shaped, two parallel buildings with a yard and drive-way between, and the T-shaped building. In any case, the office should be located alongside the entrance-way.

For a large establishment, the T-shape has many advantages. The main essentials are, to be able to go or communicate quickly from the office to any part of the factory. Also, every department should be easily accessible to any vehicle without

taking off its wheels. For these purposes, the ceilings should be high and the doors opening properly. Attention to these points in the outset will greatly facilitate future operations. Regarding an elevator, when one is employed, the cross-beam should be high enough and the platform large enough to accommodate the largest city truck or buss without un-hanging. A chute is very handy for conveying small pieces to any spot desired. An incline may be substituted for an elevator and has the advantages of rapidity and saving of labor, but it takes more room. In case the vehicle must be unhung, that expense should also be reckoned in with the cost of the job. So much for the large concern.

In a repair shop, of course everything should be arranged with refer-

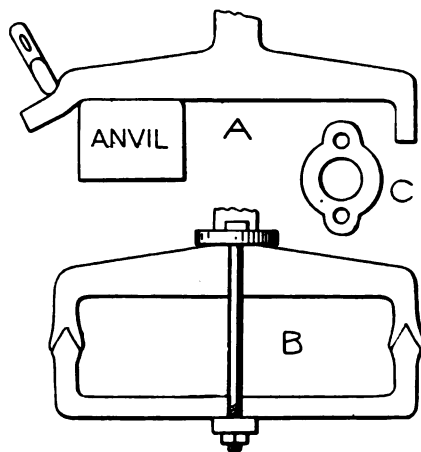


Fig. 36. SHAPING AND WELDING THE VALVE YOKE.

ence to handling work with the greatest convenience. The woodworker's bench should be on the same floor as the smith shop and adjoining it, or even in the same room. The stock room should be situated near the main entrance. The scales, the wash-stand, or platform on which the old or new vehicle may be run to be washed, and a bench for odd repair work should all be near or adjoining the stock room. It should be so planned that a vehicle may be removed from or entered at any part of the shop without disturbing the other parts.

To-day, everything possible must be done to turn capital more rapidly, if the establishment is to be successful. How to make the same shop, in room, time, labor and permanent investment of capital do the greatest amount of business—that is the problem of the business man. Time saving devices

that allow the work to be done in, say, half the time employed by other methods, save not only half the cost of labor but of shop rent and insurance. Every step and movement of a workman takes time and costs money.

One mistake often made by employers is that of keeping the foreman utterly in the dark concerning the business, except about his own immediate work. In the case of a large establishment, the foreman of each department should know something of the requirements of all the other departments. This is necessary to the intelligent co-operation of departments. A good plan is to have duplicate cards of all orders relating to each vehicle, given to each department. Another plan is to have a separate card attached to each portion of the vehicle likely to be removed or detached. The full directions are placed in a book, one in each department which is open to every employee. This insures against all misunderstanding. The latter plan has the advantage of saving the time required in hunting up the vehicle body, gear, wheels, shafts or other parts every time one wants to consult the card for instructions, by simply consulting the book at the foreman's desk. In this book a margin may be left in which to enter, each day, the state of progress of the vehicle. These conveniences are as applicable to the small as to the large shop.

In adopting any new device the shop owner should carefully consider the expenditure and the benefit likely to be obtained by its use. In the small shop, it is often cheaper and quicker to do much by hand than to put in a lot of expensive machinery.

(To be continued.)

Some New Ideas Relating to Hoof Contraction.

So many diseases in horses' feet take their rise from contractions of the hoof that any new means to prevent or cure this defect must be of very great interest to every farrier or horse owner. Therefore, in the interest of the craft at large, we give, herewith, a description of a set of new devices in the form of heel expanders—the patented invention of Mr. Robert Moser of 1916 Baltimore Avenue, Kansas City, Mo.

These expanders, says Mr. Moser, are intended to check the tendency of the hoof to grow inward and to gradually force it outward from the frog until

normal shape and conditions are restored. Or when the abnormal condition has become chronic, the device will give relief and render the animal fit for use. The expanding devices are of many kinds, but only three varieties of them are taken up in the present article. The first expander is intended for hospital use—that is, for sick horses not working (See Fig. 1). The forward end of this expander is usually supported only by a bandage. They may also be used with rubber pads, on horses in use.

For ordinary style of expander, Mr. Moser has devised a practical means of supporting the front end of the angular spring; this is furnished with a threaded loop-hole or eye at the angle, to which is rigidly secured a flat, fork-shaped attachment of soft steel by means of a little set-screw. Both arms of this attachment extended outward between the hoof and shoe so that the ends rest upon the former. It is made quite thin so that the arms may be bent in any direction thus to accommodate themselves to hoofs and shoes of any size and form. Any excess in length may be clipped off.

This same device may also be used on invalid horses in pasture cure, by fastening the flat ends to the hoof without the support of shoes. In this case, another soft steel attachment is selected with broader arms and two little holes are punched at the proper points on the extended ends of this fork-shaped attachment to meet if possible the old nail holes of the toe part. Both punched arm ends should be cut or let in to the horn of the toe sufficiently to save them from too much direct contact with the ground, and fastened with two

hoofs have short toes and thin soles, a soft steel form must be attached to the expander with extended arms wide enough to allow the ends to run out away from the injured or weak toe.

Mr. Moser states that he has applied over six hundred of these expanders to various kinds of working horses and

behind from hook to hook should be about one inch greater than the width of the heel. In contracted feet, there is usually thrush in the frog. When the expanders are applied, the hoof is opened up immediately and often to such a degree as to be perceptible to the operator. The opening is often from

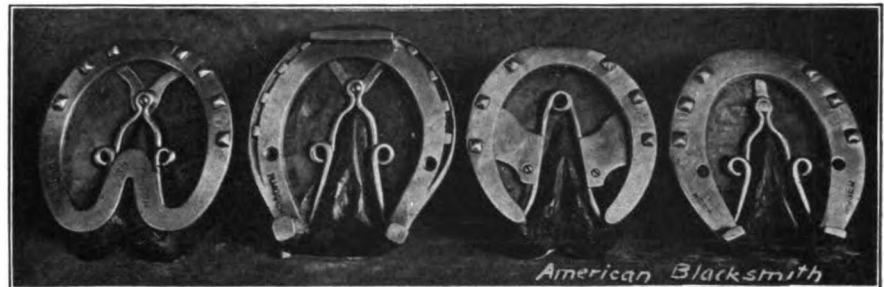


Fig. 2. EXPANDERS APPLIED WITH SHOES.

has never lost a single piece. The little pointed hooks on the ends of the spring arms, when adjusted into the hoof, make it very secure, exerting a strong and continuous pressure upon the side of the heels to which they are applied. This pressure prevents the frog from being crowded by contracted heels. The pressure of the spring continues uniform, accommodating itself without noticeable diminution of force to the heel as it expands.

One very important point is emphasized by the inventor of these devices: viz.: he advises horse shoers not to saw or cut through the hind ends of the heel as it weakens the whole hoof. On every horse's foot a pair of horny braces extend from the heel, where they are connected with the shell of the hoof, to the sole, along the sides of the frog. These braces are easily separated from

$\frac{1}{4}$ to $\frac{1}{2}$ inch according to the conformation of the hoof.

In case the heel and frog are very hard and dry, a small hook should be filed on the expander, and when the parts are very closely pressed together, take an iron or file shaped similarly to the hook filed on the expander, heat it red hot and press it down between the frog and the heel about $\frac{3}{4}$ of an inch deep—never less than $\frac{1}{4}$ inch, according to the level or bottom line of the heel. In the event of specially stubborn cases, a special spring of double coil is substituted, as shown in the engraving, Fig. No. 2.

The inventor has made a special study of this phase of horseshoeing and is an enthusiastic student of the scientific principles of his craft. His ideas are well worth considering.

A Georgia Price Schedule.

GEO. P. BLANCHARD.

Shoeing, all around.....	\$1.00
Shrinking tires.....	0.50 and up
Refilling a wheel, new spokes	0.10 to .25
New buggy rims.....	\$1.00 to \$1.50
Wagon tongues.....	1.50
Shafts, each.....	.75
Cross bars.....	.50
New tires, per set.....	4.00 to 8.00
Painting buggies, three coats.....	3.50
New wheels, per set up to 1 $\frac{1}{4}$ in. . .	10.00

Recipes for Tempering Steel Springs.

A very common query from smiths is how to temper various kinds of steel springs. Hence, for the benefit of the craft, we give the following recipes for performing the operation in several cases.

When the spring has been carefully

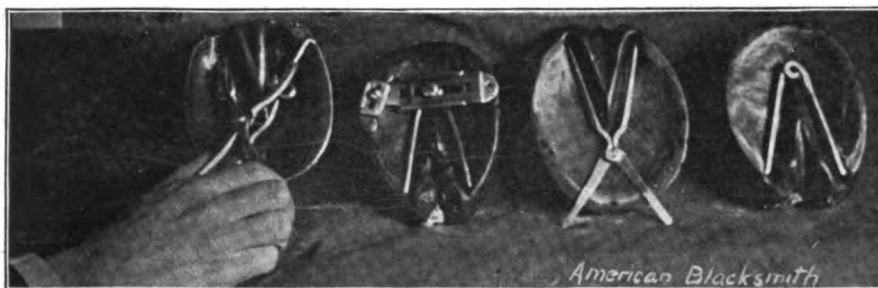


Fig. 1. PATENT SPRINGS APPLIED TO THE HOOF WITHOUT SHOES.

extra light nails or wood screws. This operation is so simple that it may be performed by any horse owner. When this arrangement is used on working horses, care must be taken to have the fork-shaped attachment level with the surface of the horn, as this prevents their pressing on the hoof more than any other point of the shoe does. When the

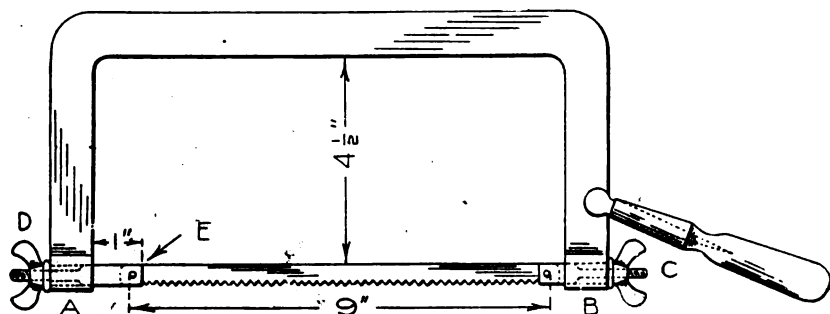
the heel by careless cutting; hence the danger.

These expanders are all made of round silver steel wire about $\frac{3}{16}$ of an inch in diameter. Its pressure depends upon the extension of the side arms and especially upon the hind ends of the pointed hooks. These latter should be about $\frac{1}{4}$ inch to $\frac{1}{2}$ inch long. The width

forged, finished up and is ready for tempering, clean out the forge and make a brisk fire with good, clean charcoal, or, if bituminous coal must be used, see that it is well burnt to a coke, in order to free it from the sulphur that it contains, as sulphur will

animal charcoal or with bone dust packed around them, similarly to the process of case hardening. When thoroughly heated, cool in a bath of oil and proceed to temper them by putting a handful of them in a sheet-iron pan with tallow or oil and agitating

it usually strikes at E. The handle was a chisel handle, $1\frac{1}{2}$ inches at its largest part, the shank being welded to the frame as shown and bent down until the natural center of the hand was in line with the saw blade. Otherwise the frame could be made in the manner hack saws usually are. If made of spring steel, the frame might be made lighter, but I find the extra weight an advantage rather than a fault and I find the frame being made $4\frac{1}{2}$ inches from the saw a still greater advantage. The handle may seem out of shape when the saw is turned to the side, but it is not more so than on those now in use, and its much greater convenience when used where nearly all of the sawing is done is too great for it to signify. No brother blacksmith will regret the time spent in making one, if he has use for one at all. I would not exchange mine for any other I ever saw unless I received besides it the price of making one of these. This handle can be applied to saw frames now in use.



AN IMPROVED STYLE OF HACK SAW FRAME.

destroy the "life" of the metal. Carefully insert the steel in the fire and slowly heat it evenly throughout its entire length. Give it time to heat through its thickness and when the color shows a light red, plunge it evenly into lukewarm water, or water from which the cold chill has been taken off, so as not to chill the surface of the metal too quickly before the inside can also harden, and let it lie in the water until it is of the same temperature as the water. A much better substitute for water is a good quantity of animal oil—whale oil or lard oil is best. As a substitute, we have used lard, by melting it before we inserted the heated steel in it. The advantage of using oil is that it does not chill the steel so suddenly as water and there is less liability to crack it. Remove the hardened spring after it is sufficiently cool and prepare to temper it. Make a brisk fire with plenty of live coals and smear the hardened spring with tallow. Hold it over the coals, but do not urge the draught of the fire with the bellows while so doing. Heat gradually, moving the spring over the fire to receive the heat evenly. In a few moments the tallow will melt and take fire and blaze for some time. Let it blaze freely, circulating from end to end, to thoroughly envelop the spring. Blaze (again smearing with tallow) a second time. If the spring is to be subjected to a great strain or is to perform much labor, it should be lightly blazed a third time. If it is to be exposed to heat and cold, it should be left to cool off and not cooled in water or by throwing upon the ground.

Spiral springs of steel wire as used for spring balances are tempered by heating them in a close vessel with

them over a brisk fire. The tallow will soon blaze and the shaking will cause them to heat very evenly. If a long, slender spring is needed that requires a low temper, it can be made by simply hitting the soft forging on a smooth anvil with a smooth face hammer. The metal will be sufficiently compressed to form a very good spring without further tempering. A light hammer and "many blows," and the spring will last a long time, when there is to be no great labor in its action.

An Improved Hack Saw Frame and Holder.

JOHN.

The trouble I have had with the hack saw frames that have been on the market, was that they were as a rule, too light, and the handle was so small and ill-shaped that they cramped the hand, and as it became painful, one lost control of the saw and made a mistake which resulted in a broken saw. Therefore I took a piece of tire steel, $1 \times \frac{3}{8}$ inches, bent it into shape as shown in the cut, scarfed and turned the end, B, over a piece of round $\frac{3}{8}$ -inch steel and welded the scarf, which for all practical purposes only requires sticking. The end, A, was turned over a square piece in the same way, and the hole trued up with a square file. The round hole was squared only at its front ends so that when the thumb nut, C, was turned only two turns, the square part of the saw holder could be turned in other directions. The saw holder at the other end of the saw was left longer, so the end of it would strike the piece being sawed and not the thumb where

A Rule for Measuring Tires.

G. E. BUCKLEY.

Take the wheel to be tired and place the open joint on the end of the tire, roll once around and mark it. Allow three times the thickness of the tire for bending, and also enough to make the weld. This will give you the point at which to cut the tire iron. I have no trouble with this method and it is quick and easy.

Still Another Tire Bolt Holder.

An interesting model of a tire bolt holder, the invention of Mr. A. D. McShane, of Monument, Colorado, has just been received by THE AMERICAN



AN ADJUSTABLE TIRE BOLT HOLDER OF INGENIOUS DESIGN.

BLACKSMITH. The model is cleverly executed in wood and iron. The accompanying sketch is taken from this model, showing the levers and pin of wood and fork of iron. The tool, however, is intended to be made of iron or steel, the pin B, being of steel.

To operate, place the forked hooks, A, over the felloe of the wheel, and by swinging the lever, E, from the handle, D, adjust the pin, B, to hold bolt in any thickness of rim. To further graduate

the tool to fit still lighter wheels, the pin may be moved forward and pivoted from the holes at C.

Steel and How to Treat It—1.

Selection, Experimental Treatment and Testing of Steel.

JOSEPH V. WOODWORTH.

The treatment of steel is a subject of unending interest and although it has been discussed quite fully, there are still large numbers of mechanics who are not familiar with the fundamental principles, and practical points necessary to treat steel successfully. In these articles it is the purpose of the writer to discuss the treatment of steel, and present clearly and concisely the various practical, approved methods for heating, hardening, tempering, annealing and forging, and while some may find in them nothing new, I am certain that many others will find much of interest. The articles will be written from a distinctly practical point of view and anything purely speculative will be omitted.

The first thing for the steel worker to appreciate is that in order to succeed it is necessary to commence with good steel, and the sooner he realizes that good results can not be secured from poor steel the quicker he will commence to succeed. The keystone of successful steel treatment is economy, and this can only be obtained by purchasing steel which is uniformly of the best quality, as its ability to retain a cutting edge for long periods makes it the cheapest and most economical in the long run. Any mechanic that has worked the different brands of steel into tools for cutting purposes knows that cheap steel is *very expensive*.

In regard to the selection of steel, too much can not be written. It is an art by itself and one can become proficient in it only after long experience in treating and using the different brands. Thus, one will strike a grade or brand which can be hardened successfully, with the positive assurance that satisfaction in use will be guaranteed. When a brand of steel which will do this is found, it will be well to stick to it.

To decide whether a brand of steel is of high grade, one must understand how to treat it. Very often a piece of steel is condemned as being of poor grade when as a matter of fact the man who treated it was to blame, because he did not understand the

proper processes, or else the steel was used for a purpose for which it was not intended. Numerous, indeed, are the causes of failure in the use of high-grade steel. Very often the steel is overheated when forging, hardening or annealing, or the percentage of carbon is not right for the purpose for which the tool is to be used. However, the most frequent cause of failure in the treatment of steel is found in the hardening process, as all too frequently those who do this work fail to realize that it is an operation requiring experience and skill of a high order.

In order to determine the correct hardening process for high-grade steels the mechanic must first be familiar with the characteristic appearance of the grain of steel that has been hardened properly: as the condition of the grain denotes whether the process has been correctly applied or not. Let us say that a bar of high grade steel is selected, and grooves turned in to it as shown in the figure, after which



A BAR OF HIGH-GRADE STEEL WITH GROOVES FOR TESTING.

we place one end of the bar in a good fire up to the first groove. When the section of the bar in the fire has reached a white heat and the remainder of the bar a dull red, we quench it in cold water until perfectly cool, then remove and dry it. We may now test the different sections with a file, and will find that the first section is glass hard, and the intermediate sections of degrees of hardness passing from the hardest to the softest. Next we will break the different sections apart and find in the grain of each the results which occur in steel sections hardened at different temperatures, and from them learn at what temperature the ideal results may be obtained. We find that the first section has an open and crystallized grain; and that the other sections get closer in grain as they approach the end. Somewhere around the center of the bar we will find the grain of an even and velvety appearance which indicates a hard and tough structure. This is the section that has been subjected to the proper degree of heat in accordance with the carbon percentage of the steel. For a piece of steel to be hardened properly it must be both hard and tough, and to attain these results

the heat must be high enough to harden it through, but not high enough to open the grain.

The proper treatment of steel cannot be learned from books or articles alone. They will, to be sure, teach one to understand the nature and peculiarities of steel and point out the way to successful results; but the road of experience must be traversed by the individual before he can hope to become expert. First let the mechanic learn the different brands; experience in their use will show to what purposes they are best suited. Although one may be familiar with all brands of steel it is not always well to depend on this knowledge altogether, especially when a large number of tools are to be made from the same grade. When this is the case it is always best to test the steel before using it, as it *may* be found wanting. Cut off a thin disk and harden it at a low red heat. Then crack it across the center and any defect which may run through the center of the bar will be apparent. If the steel proves defective do not use it; if sound examine the grain, being careful not to wet the fracture. If the steel is good and has been properly heated and quenched,

the grain will appear fine and close. If the process has been wrong or the steel is poor, a coarse appearance similar to broken cast iron will be presented. While a coarse grained steel may be safely used for tools which will not be subjected to much strain, it should never be used for tools which have to do heavy work. For hardness test the center of the fractured disk with a file, while for great hardness try an edge of the fracture on a piece of glass and if it cuts the glass, satisfaction will be assured.

Aside from hardness and temper, there is another condition which should be present in steel which is to be used for general work and that is toughness, and while many steels will become fine grained after hardening and will be of proper carbon percentage they will not toughen. This is the quality to be prized in steel which is to be used for making expensive tools, and whether the steel possesses it or not should be ascertained before proceeding with the working of it. To do this, harden a thin disk and place it on the anvil. Then strike it heavily with a hammer; if it breaks instantly, the steel is brittle and not tough

enough, while if it requires several blows to break it, and the surface flattens a little before breaking, it is steel of the finest grade and may be used with the certainty assured that it will stand up well.

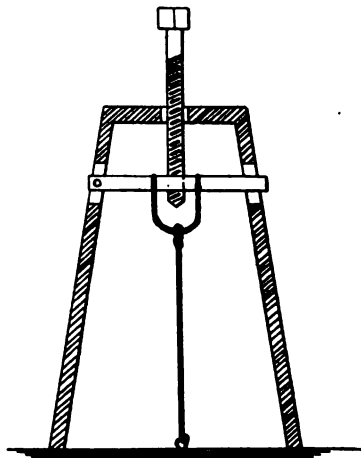
To some it may appear that the testing methods are both unnecessary and expensive; but this is only at the beginning and although the tests may be often dispensed with, it will be well to try them before making costly tools and thus prevent mistakes, which would mean much more than the time spent in testing. We are constantly hearing of what this machine or that machine can do but very rarely indeed are the cutting tools used in them mentioned, and still if these cutting tools were not hardened and tempered properly, what would be the accomplished results? I am sure that but few men in places of importance in shops realize how much depends on the man who does the hardening, and that but for him a large amount of money would be lost. When it is considered that where the cutting tools are not properly hardened, accuracy and economy are impossible, the factor of proper hardening will be appreciated. Thus today, the hardening of tools in many shops has become an art by itself and only those who have devoted years to becoming expert in it are employed to do the work. It is not unusual to see an advertisement in a trade paper calling for an expert hardener at good wages; in fact there are any number of shops where such positions are not filled merely because they can not get men sufficiently expert to do all of the work in this line. Manufacturers are beginning to appreciate the fact that they are losing a lot of money through their tools not being hardened properly, and just as soon as this fact becomes universally appreciated—as it will soon be—there will be a demand for expert hardeners that will be difficult to supply.

Hence it would be well for those who now have the opportunity, to become skilled in the art of steel treatment. But let it be remembered that it is an art and *not* a side line, and that to become successful in it, constant application, high grade skill, experience and good sound judgment are absolutely necessary.

Naturally the reader is apt to ask: "How can one become a successful hardener of steel" and it is my purpose in this series of articles to point

out the way to succeed in this line as well as in the other processes of steel treatment. The first requisite is a knowledge of the nature, and peculiarities of steel, and I have pointed out how to go about learning these things.

Of course all grades of steel can not be used for the same class of tools. Thus a fine edged cutting tool cannot be made from chisel steel, nor a good milling cutter from hammer steel.



A NEW AND USEFUL WHEEL-BENCH.

Hence to do the first operation properly in the treatment of steel—that of heating it—one must first be familiar with the peculiarities of the particular steel of which the tools are made, as but few steels are affected alike by the action of heat. So before closing and taking up the heating processes I repeat: *Know your steel before attempting to heat it.*

(To be continued.)

A Wheel Bench of Useful Design.

R. R. TICHENOR.

I wish to describe here the way in which I have fixed my wheel bench, so as to save a great deal of heavy lifting. I take a piece of $1\frac{1}{2}$ -inch axle stub from six to eight inches longer than the distance across the bench, and punch a hole through one end to hinge on one side of the bench. Then I put a hole far enough from the end to come directly under the hole in the bench through which the bolt goes that fastens the wheel. Next I drill a hole on each side of the center hole and through this put a staple which extends about four inches below the first piece. This staple is for the purpose of fastening the hook that leads to the floor. Cut threads in the center hole and put a bolt through it from the top by which it can be drawn up tight. This will be understood from the illustration here-

with. The cross bar should be so fixed that it will drop enough to let the hooks out easily when the bench needs to be moved. There should be a hook or something to hold the bar up level, so that the bolt will start easily. I make two bolts of different lengths, one for wagon work and one for buggy work. This saves lifting the wheel over the center rod.

Tales of a Traveller.

JOHN T. CHANDLER.

While recently paying a visit to my old home in England, I had the opportunity of studying the condition and circumstances of my brother smiths and particularly the country smiths, as I stayed for a time in my native home with one of them whose father and grandfather were both smiths, his father being one of the prize horse-shoers in the north of England, while his brother is a horseshoer in a cavalry regiment in South Africa. The condition of the smiths in that part of England, Yorkshire, is good and compares favorably with the conditions of the smiths in the United States, but they are away behind us in the matter of tools, working along with the same old tools that their fathers and grandfathers used, although some of the more progressive smiths are putting in modern tools.

Going to the shop where I spent five long years as apprentice, with no wages, only my board and aprons found, I discovered the son of my former master with the same old tools and same old ways, no drilling machine, only the same old crank and beam process that I know has been used for fifty years; the same anvil, bellows, vice, taps and dies that I used to use, together with the old-fashioned lathe, and seemingly in as good condition as they were fifteen years ago. And yet this man has a fair amount of work and makes a good living.

In the village of Tanfield, one of the prettiest places in England, lived old man Smith. He died last December, aged 65, and left a comfortable fortune to his children. This smith worked in the same shop for fifty years and his father worked there before him, and I believe the same tools that are there today are the same as the elder Smith worked with, and yet these men turned out work superior in quality and finish to our present day smiths with all their improved appliances. These are a few instances of the kind of smiths I came across. On the other hand, of course, there are smiths who have

improved machinery. However, I saw only one tire shrinker there and that one was bought by my brother-in-law at my persuasion. Their work is principally horseshoeing and repairing.

I saw very few machine-made shoes in England. They all make their own horseshoes, hammer out the old ones into new ones when they have them, and if not, make them out of bar iron. The horses are nearly all shod with plates, except the very heavy horses that are used exclusively for draying. There is a great deal of repair work, such as repairing harrows, plows, carts, etc., and which keeps the blacksmiths busy. Prices are good, that is, for England. A scale of prices which I cut out of one of the papers reads as follows: "Owing to the advance in price of iron and steel, the Blacksmiths' Association of Darlington have been compelled to put in a new scale of prices for work done as follows:

Heavy cart horses, per set, 6 shillings.	\$1.50
Ordinary cart horses, per set, 5 shillings.	1.25
Farm horses, 3-6 to 4 shillings.	.85 to 1.00
Toe piecing extra.	
Carriage horses, 5 shillings.	1.25
Hunting horses, 5s, 6d.	1.35
Setting cart and wagon tires, 3 to 4-inch tread, per set of two, 10 shillings.	2.50
2 to 3-inch tread, 8 shillings.	2.00
Heavy rolley tires (4 tires), 12 shillings.	3.00
Light rolley and cab tires, 10 shillings.	2.50

This is but a sample of the prices received, so that you will see our English brothers do not suffer in comparison with our prices when it is considered that iron and nails and hardware are from twenty to thirty-five per cent. cheaper in England than in the United States.

A Time Saving Tire Measurer.

J. DOWNSWELL.

The tire measurer which I here describe will prove a success to any who will make and use it a short time. Using it, I have put on sixty new tires in an hour with one helper. I have my tire form just in front of the anvil. The helper fits up the wheel while I run another wheel. I heat in the forge, and it requires just a turn in the fire to expand it enough.

The sketch shows a view of the tire measurer in operation. A is the handle, with a $\frac{3}{4}$ -inch set-off to keep the wheel B from the bolt holes in the felloe. C shows a section of the felloe. With this device you can run a wheel or tire and strike the mark every time with no trouble at all.

Luck in Blacksmithing.

THOMAS BEASLEY.

Many circumstances are ascribed to "luck" which, in reality, are the out-

come of careful, painstaking work. The following is an example:

A Yankee blacksmith who took great pride in the fact that no job ever stumped him, went to England to see how the trade flourished on the other side of the pond. After arriving in Liverpool he made a tour of inspection, and being somewhat short of cash, decided to seek a job and at the same time show the "blooming Britisher" what a "blasted American" could do. He went into a little repair shop on the water front and asked the proprietor for a job, explaining that he was well up in marine smithing.

The boss told him he was just the man he was looking for, as he had a 15-inch by 45-foot steamship shaft that was broken and had to be welded. As his means for this job were somewhat limited he could not induce any smith



AN INGENIOUS DEVICE FOR MEASURING TIRES.

so far to take it up. Our American friend was keen for the job and asked the boss to show him the smith shop so he could figure the best way to do it. After the inspection the Yankee stated that he would undertake the work and guarantee results, if the proprietor would furnish the help and not interfere with his arrangements, all of which he agreed to do. Our Down Easter's first request was for the best cricket players in the city—about a baker's dozen would do, and about ten men to help handle the shaft and wield brickbats for him. Of course these requests made the Britisher open his mouth to expostulate, but the man from "Boston" got in ahead of him by saying he was doing that job and would deliver the goods when the Britisher kept his promise.

To make a long story short, he organized his gang and instructed them minutely what to do. Instead of welding the shaft with sledges he used cricket players with brick bats to pelt the hot iron, and by having rounded bats and soft ones to finish the work with, succeeded in doing a job that upheld the prestige of our country and caused the Britisher to faint with envy and surprise. I don't vouch for the truthfulness of this story, but as an Irishman told it, and they have a national reputation for veracity, it must surely be so. However this may be, it teaches a lesson.

There is nothing like using a little

originality. Who but an American would have thought of making use of cricket players to supply power in a blacksmith shop! And the result was not only the accomplishing of the job, but the winning of a reputation.

Master Boiler Makers' Convention.

The second annual convention of the International Railway Master Boiler Makers' Association was held at Columbus, Ohio, May 19th to 21st, with 100 delegates in attendance. The Rev. Byron R. Long invoked Divine blessing, after which Governor George K. Nash made a very pleasing opening address, which elicited much applause. The association was welcomed to the City by Mayor R. H. Jeffrey, George T. Spar, of the Columbus Board of Trade, and especially by S. D. Bush, president of the Buckeye Malleable Iron Works. A response to these addresses was delivered by President F. J. Graves, whose words were full of appreciation of the royal welcome given.

Denver was chosen as the next meeting place and the following officers were elected:

F. J. Graves, C. & O. Ry., Huntington, W. Va., Past President and Chairman of the Board of Finance.

J. A. Doarnberger, N. & W. Ry., Roanoke, Va., President.

W. H. Laughridge, Hocking Valley, Columbus, Ohio, First Vice-President.

J. T. Goodwin, Richmond Locomotive Works, Second Vice-President.

C. L. Hemple, C. B. & Q., Omaha, Neb., Third Vice-President.

James Johnston, N. P. Ry., St. Paul, Minn., Fourth Vice-President.

W. J. Richie, C. O. & G., Shawnee, Okla., Secretary and Treasurer.

The following report on flue welding was one of many interesting papers read:

Mr. President and Gentlemen of the Convention:

Your committee to report on setting flues and manner of taking care of same, desire to say, that while they appreciate the fact that there is considerable difference of opinion as to any method which may be adopted by this convention, to suit the different ideas of the foremen of boilermakers throughout all sections of the country, due to limestone and hard water that is commonly used, yet after due consideration we would respectfully recommend the following practice for setting flues, to-wit:

First. The flue to be swaged $\frac{1}{4}$ inch under size of original diameter, then the

flues to go to annealing vat, which consists of lime and sawdust. After flues are cooled off, the flues are taken to cutting machine where length is gotten. While flues are at this machine, the scale is removed from swaged end by a small emery wheel or file; when re-pieced flues are being used, would recommend that the front end of flue be heated and allowed to cool off before applying to boiler.

The copper ferrules that are used in back flue sheet to be No. 14 or No. 16 in thickness, being $\frac{1}{8}$ wider than thickness of sheet. The ferrules to be slightly rolled in sheet to be flush with face of sheet in furnace. Then the flues to be applied with allowance of 3-16 inch for beads, and by clinching same to hold in position by lipping one edge of flue with hammer. The flue to be rolled and pros-tered, then beaded. After this process, flues should be lightly rolled. The best tools for setting same are roller and sectional expanders.

The question of caring for flues while in service depends largely on engine house management, as well as proper judgment being exercised by engine men in their daily performance of delivering the required tonnage on their divisions. At ash pits, judgment should be used in keeping air draughts from furnace, fire doors and ash-pan dumpers.

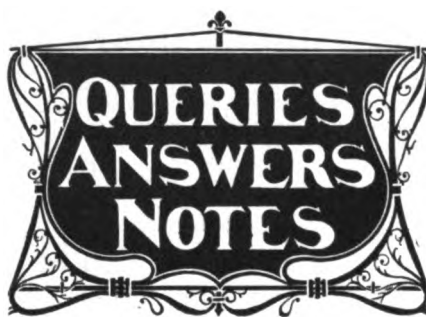
We are constrained to believe that education along these lines by our master mechanics and the men who handle the engines, in cleaning of fires and reducing pressure for boiler washing, etc., would no doubt make a very noticeable improvement as regards engine failures, as well as getting the desired mileage out of the flues, thereby showing a saving that would be very acceptable to any management. J. T. GOODWIN, Chairman.

By W. H. Shaw:

In my opinion, the best fuel for welding flues is oil, and it is cheaper than coke. In most places where flues are welded they have two men with a coke fire and one has to be poking down the fire nearly all the time; and if you have poor coke there is always a scale on the flue when it comes out of the furnace when hot. This is bad and it sometimes spoils the weld.

It is not so with an oil furnace. If you supply the oil furnace with oil and air, you get better results. Your flues will heat quicker and have no scale to contend with. A bumping block can be placed at the rear of the furnace for the welder to bump the flue when it gets hot. And one man can weld all the flues you can handle for

almost any shop with an oil furnace and a Hartz flue welding and joining machine. The reason why I favor the Hartz flue welding machine is this: When a flue leaves the mandrel the weld is rolled and it makes a very neat weld. The flue is not lumpy like old hand or trip hammer welding. The percentage is very small for leaky welds. We never test our flues. We take them from the machine and put them in the boiler, and in 300 flues, we take out from four to six, on an average, that have leaky welds. This speaks well for the Hartz machine."



The following columns are intended for the convenience of all readers for discussions upon blacksmithing, horseshoeing, carriage building and allied topics. Questions, answers and comments are solicited and are always acceptable. For replies by mail, send stamps. Names omitted and addresses supplied upon request.

Drawing Temper—I wish to know how to draw the chill temper from chilled castings. JOHN A. DANIEL.

Setting Buggy Axles—I would like to know a simple way for setting buggy axles and also a rule for making wagon axles. E. A. LOCKHART.

Turning a Small Crank—Can some brother blacksmith tell me how a small crank is turned—a shaft two feet long and a 6-inch crank in the center? M. H. MATTHIESEN.

Shoeing Question—What kind of a shoe will stop a horse from mixing, that is, crossing from pacing to trotting when driving? Will somebody tell me? J. ARCHIBALD.

Blacksmith Coal—Will some one tell me where I can get a good, clean blacksmith coal? The coal which we get here is both dull and dirty, and I do not know where to get any better. WILLIAM FOLEY.

Tempering Springs—To temper cast steel springs, all that is necessary is to heat them in the dark just enough to see that it is red. Then cool in lukewarm water. Draw the temper. I have always found this successful. W. M. F.

A Shoeing Inquiry—Will some of my brother smiths give me instructions of how to shoe a horse which throws out his front feet and strikes on his heels and then rocks over on the toe? He wears his shoes off on the heels round up to the hoof. J. M. R.

A Recipe for Mill Picks—Two ounces of alum, two ounces of saltpetre, one-half ounce of sal ammoniac, one and one-half pounds of salt, and three gallons of soft water. Heat the picks to a cherry red and plunge them in the above preparation, and draw no temper. W. M. F.

Shoeing a Hopping Horse—In answer to Mr. N. T. Outwaters in the April issue as to how to shoe a hopping horse, my advice is to make the heel calks one inch and the toe calks $\frac{3}{4}$ of an inch long on the foot that hops. He can try this and see what that will do for the horse. JOHN H. LAYNG.

Ship Smithing—For an answer to his question on page 138 of the April AMERICAN BLACKSMITH, J. E. Clark is referred to the article by W. L. Paul on a foregoing page entitled "Iron work for Schooner Masts and Spars." THE EDITOR.

Hardening Plow Lay Centers—Will some brother blacksmith give me a recipe for hardening soft center plow lays perfectly so that it will neutralize the scale and leave a nice smooth surface, and one which will do the work uniformly at a low heat? W. A. HENRY.

A Question About Machinery—Will some brother craftsman tell me if it would pay to buy foot power machinery such as rip and cut off and band saws when unable to buy a gasoline engine? I need these machines, but would like to know if it is advisable to buy them or not. G. P. BLANCHARD.

Shoeing a Cow-Hocked Horse—In reply to Herman Hoffman's inquiry in the March issue of how to shoe a cow-hocked horse, my experience has been to shoe them with a low toe and a fair length shoe with side calks. I find that they travel the best when shod in this way. F. J. HEYWOOD.

Interfering—I should like to have the opinion of my brother smiths in regard to a case of interfering. I have a mare that hits her right hind foot with the left, and I have tried most everything in the line of side weights, also raising the inside a little, and none seems to work. JNO. P. WINTERS.

Another Shoeing Question—Will some brother blacksmith tell me how to shoe a horse which I would call passing-gaited, that is, she starts with a pace, and when she slows down, she strikes a pace, and oftentimes changes from a trot to a pace. What I desire to know is how to shoe her so as to make her trot and stop pacing. The fault is common. CHAS. D. BRIDDELL.

Welding Toes on Horses' Shoes—In answer to Mr. E. D. Hayden's question as to how to weld toes on horse shoes, so they will wear sharp, take a piece of steel about $\frac{3}{8}$ of an inch and weld soft band iron on both sides of it. Now sharpen and weld on the shoe, and the toe will always wear sharp, if the horse wears the shoe down level. Let Mr. Hayden try this. L. E. MORRIS.

Toe Calks—I make my toe calks from the iron bar and weld them on the shoe, and after they are dressed, as also the heel calks, and the shoe fitted to the foot, I heat the shoe on to case harden them. I put on, when hot, prussiate of potash, finely pulverized. This kind of work on toe calks keeps them from breaking. I have used this for thirty-six years and had success. W. M. F.

A Ratchet-Wrench for Tire Bolts—First forge a piece as shown at A, from a piece of steel, 1 by $\frac{1}{4}$ inch with an inch hole in the head. Then forge another part, B, $\frac{1}{8}$ inch wider than the first, after which cut it out, as indicated, making it from some old mower section or other light steel. Place the two pieces together, put a ratchet on each side and rivet together. Adjust your spring, and you will have a labor-saving wrench. G. L. COLEMAN.

Galvanized Piping—Will some one tell me through these columns how long a galvanized pipe will lie underground without

any water passing through it? How long can it lie before it is entirely rusted away? Also how long will it last above ground when well covered with paint, and how long will galvanized sheet iron last above ground before it is entirely gone? HANS HANSON, JR.

Iron To Tire a Wheel—In answer to the question of H. W. Berge as to how much iron it takes to tire a wheel, would say that one way to determine this is to lay the tire down on the floor, take the wheel and put it on the tire, and then, putting one joint of the rim at the end of the tire, roll the wheel once till you come to the joint at which you started, allowing an inch for shrinking when bending and welding. CLAUD BAILEY.

Tempering Turning Chisels—I notice one of the craft desires to know how to temper turning chisels or tools. I dress them to the shape I want them and then push them in the ground, filling the hole with strong salt water. Heat the tool to a cherry red and put them in the hole to stay until cold. This is good for high speed tools. It may seem a crude method, but I have found it to answer my purposes. W. M. F.

Welding Axles—A good way to weld axles is to upset a little, scarf down at an angle, take your chisel and cut like a file only coarser and about $\frac{1}{8}$ of an inch deep on the scarf side of each piece. Weld with old mortar that has been used for plaster. I find that it is just as good for low steel as most of the welding compounds. The notches keep the lap from slipping. I have never yet had one rip at the weld.

FRANK HALL.

Another Shoeing Question—We have a fine trotting mare, who ran a nail in her foot a year ago last January. We have shod her every way imaginable with bar shoes and tips, and have left the tips on as long as advisable. She went very well with the tips, but we thought we had better take them off as her foot was beginning to get sore. We then put pads on her, but she does not go so well. How ought she to be shod? B. W. S.

A Few Questions—Can some brother smith tell me the best way to shoe a stifled horse. I have the care of a very valuable horse which is stifled.

Will some veterinarian tell me some remedy for a colt which has the bloody gravel? That may not be the proper name for the disease, but it is the only one I know for it. It is very common in this country, especially in colts when a few days old, who take the disease and die, and there does not seem to be any remedy for the same, although there might be. J. H. WHEELER.

A Horse's Gait—In answer to J. W. Erven's question about changing the gait of a horse from trotting to pacing, I would say to him that if he will have his horse shod with shoes on the two left feet as light as can be made and save the foot, and on the two right ones as heavy as the shell will carry and be a little careful about driving for awhile, in a few months he will pace all the time with common shoes on. In shoeing a horse to trot he must be well balanced, and to change him from trotting to pacing he must be unbalanced. I have tried this method of shoeing with good success. IRA A. MUNSON.

Questions as to Long Fires and Turning Lathes—I should like to know the best way to arrange a forge so I could heat a piece of iron twelve inches long and one inch in diameter to a good uniform welding heat, without having to have a larger fire than necessary.

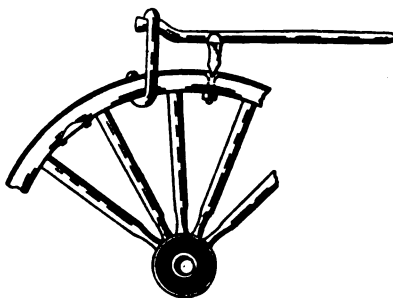
I am building a lathe for turning balus-

trades. I should like to know how to make the bits and how to fasten them to a slide so that I can turn the full length at one time by simply moving the slide bodily up to the piece being turned. I feel this would be as long a space as I should want to turn at one time. W. L. PAUL.

Home Horseshoeing—Seeing J. B. M.'s question on how to prevent home horse-shoeing, I would say that my idea is that every horseshoer should pass an examination and hold a diploma. The Society for Prevention of Cruelty to Animals ought to look after such cases as J. B. M. speaks of. If such officers would look after such cases instead of some other trifling things that don't amount to much, there would be fewer lame horses, as lots of fine horses are ruined by such cases of shoeing. I think the State ought to pass a law to help the horseshoer. There is no other class of men that need more protection. As we all know, horse-shoeing is no light work. J. D. C.

Tire Bolt Holder—The accompanying sketch of a tire tool for holding buggy tire bolts shows something which I think can not be beaten.

I would also like to say to Brother William Duff that I have made one of the tuyere



A NEW CONTRIVANCE IN THE WAY OF A BOLT HOLDER.

irons which he described and I like it much better than my old one. I must say it is O. K. J. A. GRAY.

Bolt Holders—If Brother A. Bruton would make a brace on the end of the tire bolt wrench which he described in the April paper, I think it would improve the tool.

I have a tool for shaft bolts for repairing shafts made like a bench brace and also a clamp for holding these bolts from turning and spoiling the paint. I also use it for reach bolts. I made the latter of eight-inch bar iron, having a short right angle bend at each end. One bend hooks over on to the wood at the side of the shaft iron. The other end is threaded to receive a pointed rod which screws down on the bolt head. This tool saves a great deal of time and trouble with tongs and wrenches. E. D. PENDLETON.

Questions on Vulcanizing and Tooth Chisels—Will some one with experience please tell me how to vulcanize rubber tires? Please state how it is done, and what is used.

Also, I should like to know how to cut tooth chisels for marble cutters. I have seen them cut only one tooth at a time. Is there not a way to cut more than one at a time? JOHN R. THOMPSON.

To mend rubber shoes, balls, hose or tire, the "Deutsche Chemische Wockenschriften," recommends the following process: The articles are first freed of adhering mud particles and thoroughly dried. Varnish, as for instance, on rubber shoes, is removed by means of emery paper or a file, and the part thus treated is rubbed over with ben-

zine. The edges of the hole are then painted over with a solution of para caoutchouc in benzine, a fitting strip of natural rubber is laid over it and a solution consisting of four parts of benzine, three of carbon sulphide, O. 180 parts of sulphur chloride is applied to the edges by means of some cotton wool tied to a wooden holder, this solution serving to vulcanize and to increase the resistance of the rubber. The joined parts have, of course, to be well pressed together.

What Troubles the Foot—I should like to have information on the following question. A customer of mine has a horse whose left hind foot is split from the top to the bottom of the hoof, and it rises about every three months just in the edge of the hair. I believe there is something in her foot. I wish to know how to find out the cause of trouble and if there is something in the foot, whether there would be any danger in cutting into the foot. Also I should like to know what kind of a shoe I should use, so as to make the foot grow together. When it swells, I open it, and after all the matter has been taken out, she will stop limping until it rises again. G. P. BLANCHARD.

For Brittle and Crumbling Hoofs—Mr. Thomas Robberts would like to know the best liniment for a hoof that is brittle and crumbles. I have used Dr. Danniels' (No. 1 Staniford Street, Boston, Mass.), hoof grower and softener, and I find there is nothing to equal it in keeping the hoof in good condition.

No part of the horse is less understood or more neglected than the foot. The horse was created to run wild, barefooted, with his feet constantly moist. Man has changed his condition, keeping his feet almost constantly dry. This causes at least half the cases of lameness in horses.

This remedy is a positive cure for all ailments of horses' feet, I find, whether caused by hard and constant driving on hard roads or by standing in the stables.

I am very much in favor of organization as I think it will be of benefit all 'round if all would work together. JAMES E. DOLAN.

Horseshoeing of Long Ago—In the past twenty years all styles and designs have changed considerably and especially in labor saving machines, but horseshoeing remains about the same. The first horseshoes recorded in history were made by the peasants in England. These did not resemble our modern ones, but were made of coarse grass, constructed so as to cover the whole hoof and were tied on. As these shoes did not last long in the mountainous country, the peasants made great numbers of them and sold the same to travelers who came into the highlands, who would buy them when their horses' feet became afflicted.

Later on, horseshoes were made resembling the ones of today. When King Alfred came to reign in England, he ordered his horses shod with silver shoes. These were simply tacked on with small nails and not clinched, and when the horse jumped and pranced, he threw his shoes, which had to be tacked on again by a farrier who accompanied the King's carriage.

Before the Revolution, farmers wore leather aprons similar to those worn by the blacksmith of today. OTTO STIEFEL.

Removing Broken Spokes—In reply to Mr. A. Bruton, I will say the wedge and ring is all right for whole spokes, but if broken off at the hub, I should like to have him try the following method: Take a piece of good iron seven inches long, $1\frac{1}{2}$ by $\frac{1}{2}$ inch. Punch a hole two inches from the end, and then cut out to the other end (A, Fig. 1.) Now open out and swage ends round. Next

take a $\frac{1}{2}$ -inch coach screw, weld it on one end of an 18-inch piece of $\frac{1}{2}$ -inch round iron, and weld the other end to the handle. Slip on an old wagon box of good weight and the tool is complete.

Now screw your wheel down tight on the wheel horse. If the spoke is not broken off close, saw it off. Bore a $\frac{3}{8}$ -inch hole in the tennon, take the tool with the box on it, screw in the hole tight. Take the box in

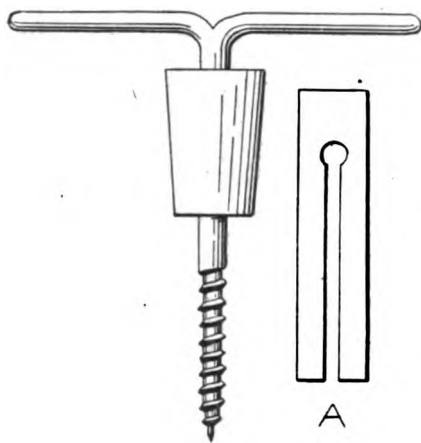


Fig. 1. TOOL FOR REMOVING BROKEN SPOKES.

hand, and strike good, smart blows on the handle of the tool and out comes the tennon. I can clear an old hub in fifteen minutes, unless newly spoked with glue. If the spokes look tight, strike a couple of blows with a heavy hammer on the back of the spoke before sawing off. If the spokes are larger than $2\frac{1}{2}$ inches, use a $\frac{1}{2}$ -inch coach screw. GEO. W. HOLTON.

Toe Calks That Wear Sharp—In the April issue, Mr. Ed. Hayden desired to know how to make toe calks that will wear sharp. Here in Illinois, we nearly all use what we call self-sharpening shoes for winter. We must make our own calks, as they are not to be had in the market, and I think it queer that some one has not yet thought of this question of calks. We buy iron $\frac{1}{2}$ or $\frac{3}{4}$ by $\frac{1}{2}$ or $\frac{3}{4}$ inches, and steel of a good grade, $\frac{1}{2}$ by $\frac{1}{2}$ or $\frac{3}{4}$. It depends on the size of the calks you desire. We place the steel between two bars of iron and weld all three together with borax, making it the desired size for toe calks. Now turn the heels on the shoes, and with a thin hardy or chisel split them and break small pieces to suit the size of the shoe. We mostly use old worn-out sickle sections, as they make good plugs. The next step is to weld with sand or borax. After the shoe is fitted, heat the calks cherry red and cool off by holding them in water until cold. A little good judgment in welding is all that is necessary for a good job. We never get less than 50 cents for a shoe like this, and in some places they get more. It is the cheapest kind of a shoe a farmer can put on his horse in winter, or in fact any time of the year if the horse is continually on the road. H. H. KAHL.

Remedying Decayed Feet—In answer to Mr. S. Shindledecker's question in the May issue, would say, make a bar shoe, using a leather pad riveted on the center of the bar with a copper rivet, which will hold it in place. Drill two holes in the shoe and pad at the third nail-hole, about $\frac{1}{2}$ of an inch in diameter. Clean off the foot, take some pine tar and oakum and pack the foot with this. Use the tar cold, as you can do a better job with it. Use plenty of tar. Nail the shoe on the foot and clinch. Next cut a groove in both sides of the foot where you drilled the

holes in the shoe, but slant them forward. Take a piece of $\frac{3}{8}$ round iron, flatten it to about $\frac{1}{4}$ of an inch wide, bend it over the foot near the top and put the ends through the holes in the shoe so as to see how much thread you need to make it tight enough. Cut the thread on both ends of the clip. Flatten the clip to about $\frac{1}{4}$ inch from the thread and fit closely to the foot. Now put on the clip and fasten it just tight enough so as to be comfortable. Clip off both ends of the clip with a bolt clipper and rivet a little so the nuts won't come off. Now file the inside nut a little round so the horse don't interfere. By using this method you will see a change in the foot by the next shoeing, but be sure that you do not leave the toe too long. Shorten the toe from the top and leave the sole as thick as possible. I have been using this method for five years with great success. J. E. G. BEHLING.

From a Shop in Missouri—My partner, J. W. Reger, and I have a shop 22 by 70 feet, with a partition dividing the iron and wood departments, and with a paint room by the side of it 20 by 30 feet, though not large enough for the amount of work. We have a $2\frac{1}{2}$ -horsepower Weber gasoline engine, and it is a dandy; a $2\frac{1}{2}$ by 12-inch emery wheel; a 12-inch polishing wheel for polishing plow shares and other work; a grind stone; a shaper, which carries a five-inch cutter head and for which we have several sets of bits for different kinds of shaping, such as bolsters, tongues, hounds, sandboards, wagon felloes, etc. This is one of the best tools we have in the shop. Also a saw table with 14-inch rip and cut off saws; a jig saw; a spoke tenoning and felloe boring machine combined, and a Bailey's No. 2 Power Drill. We have a power blower for four fires. Our little engine will run all of the machines at once, except the shaper, or former as we call it, which takes more power to run it, but we can run this machine with any one of the other machines. We might also say that we have a wood turning lathe. We build new wagons during our spare time, which gives us plenty of work all the time. The following are a few of our prices:

Horseshoeing, per span	\$2.50
Horseshoeing, per shoe, old . . . . .	.20
Polishing plow and lister shares, 14-inch	3.00
Pointing a plow . . . . .	.75

The use of the engine takes off much of the hard work attached to the blacksmith's trade, and I do not know of any better engine made than the Weber for power. It is safe and simple. S. G. MOONEY.

Hints on Brazing—I saw in the last issue of the paper, an inquiry about an oil furnace, by Mr. W. B. Wolf. I am only a young smith, but I will give my opinion on brazing and oil furnaces, as it might do some good.

To begin with I think the new way, with "Ferrofix" is the only one that can be relied upon, and if Brother Wolf has much brazing to do I think it would pay him to invest in a shop right at least. I am situated in a town where all kinds of castings are kept on hand, and a farmer never thinks of having anything brazed.

There are many ways a smith can repair castings without brazing. A farmer came to my shop last week with a casting and told me that the other blacksmith had tried to fix it, but it was so hard he could not drill it. This blacksmith advised him to take it where he could get it brazed, or get a new one. But I informed the farmer that it did not have to be brazed and that I could drill it. He thought not, but I just laid it on my fire, (not in the fire) and blew gently till it

became moderately hot. Then I dropped a piece of brimstone about as big as a hickory-nut on the places where I wanted to drill, and sure enough, when it was cool, I drilled it and riveted a strip of one-inch by one-quarter inch on each side of it and made a substantial job. Mr. Farmer was pleased and has since that day given me all his work. This is only one of the many ways one can get around brazing. What I mean to say is that I would not advise Brother Wolf to rig up for brazing unless he has considerable of it to do, and if he did I would not advise him to prepare to do it by any other means than by "Ferrofix." M. L. BEAL.

About Drawing Boards—Every one who uses a drawing board ought to know that the pieces attached to the bottoms or ends are put there to keep the board from warping, and when placed on the under surface they should be applied as follows: The pieces must, of course, be placed so that their grain will cross the grain of the board. Then, the pieces should be strong enough to resist the tendency of the board to warp. On a board 18 inches by 24 inches and $\frac{1}{2}$ inch thick of pine wood, the cross pieces should be of ash $\frac{1}{2}$ inch by $1\frac{1}{2}$, and placed about $1\frac{1}{2}$ inches from the ends of the board. Now comes the important part, these pieces should never be glued to the board, but should be fastened with screws. A screw may be put in the center of the piece—i. e., 9 inches from either end and countersunk in the usual way. Then the rest of the holes should be made oblong so that the screws (which are firm in the board) may have a chance to play back and forth as the board shrinks or swells. Of course, these screws should be sunk so that their heads are not in the way, and if a washer is placed under the head and round-headed screws used, it is best.

ANDREW F. JOHNSON, Instructor-in-chief, Technical School for Carriage Draughtsmen and Mechanics, New York.

NOTE—We are always glad of criticism—even when adverse, and try to profit by every suggestion. Perhaps the descrip-

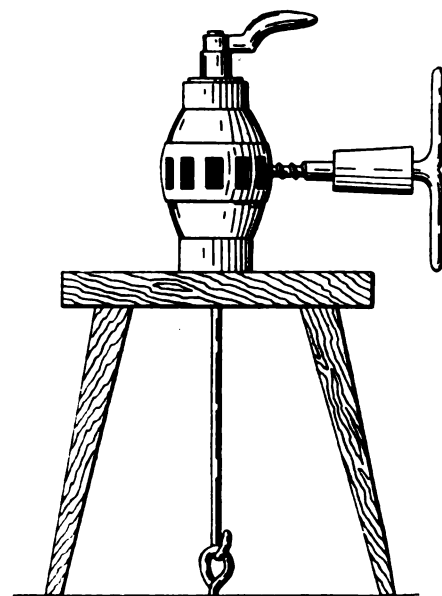


Fig. 2. REMOVING BROKEN SPOKES FROM A HUB.

tion of the mode of constructing a drawing board in our May number was not very full nor clear, but lack of space obliges us to cut down such descriptions to the most essential facts. The above detailed directions will be found a very useful supplement to our last article on mechanical drawing. We thank Mr. Johnson for the interest he has shown in this matter. [Ed.]

Prices Current — Blacksmith Supplies.

The following quotations are from dealers' stock, Buffalo, N. Y., May 20, 1908, and are subject to change. No variations have occurred since last month's figures.

All prices are per hundred pounds. On bars and flats prices are in bundle lots.

Bars—Common Iron and Soft Steel.

$\frac{1}{4}$ in., round or square; Iron, \$3.10; Steel, \$2.90
$\frac{3}{8}$ in., " " " 2.70 " 2.70
$\frac{1}{2}$ in., " " " 2.50 " 2.40

Flats—Bar and Band.

$\frac{1}{4}$ x 1 in., Iron, \$2.50; Steel, \$2.40
$\frac{3}{8}$ x $1\frac{1}{4}$ in., " 2.40; " 2.40
$\frac{1}{2}$ x $1\frac{1}{2}$ in., " 2.60; " 2.60

Norway and Swedish Iron.

$\frac{1}{4}$ in., round or square, \$4.90
$\frac{3}{8}$ in., " 4.50
$\frac{1}{2}$ in., " 4.90
$\frac{3}{4}$ x 1 in., " 4.90
$\frac{1}{2}$ x $1\frac{1}{2}$ in., " 4.20

Horseshoe Iron.

For No. 1 shoe, $\frac{3}{4}$ x $\frac{1}{2}$ in., \$3.40
For No. 2 shoe, $\frac{3}{4}$ x $\frac{3}{8}$ in., 3.00
For No. 3 shoe, $\frac{3}{4}$ x $\frac{3}{8}$ in., 2.90
For No. 4 shoe, $\frac{3}{4}$ x $\frac{3}{8}$ in., 2.90

Toe Oak Steel.

$\frac{1}{2}$ x $\frac{3}{4}$ in. and larger, \$3.50
--

Spring Steel.

$\frac{5}{8}$ to $1\frac{1}{2}$ in. Rounds. Op. Hearth \$4.00, Crucible \$6.00
$1\frac{1}{4}$ to 6 in. by No. 4 gauge to $\frac{1}{2}$ in. Flats, 4.00, " 6.00

CUMMINGS & EMERSON,
Blacksmith and Wagon Makers' Supplies,
PEORIA, ILL.

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WANTED—A first-class horseshoer and general repair man. Steady work. Good Wages.
EVERSOLE BROS., Hindsboro, Ill.

FOR SALE—Blacksmith shop and residence. For particulars call on or address,
MACK THOMAS, Curtistville, Ind.

FOR SALE—House, blacksmith shop, stock and tools. Good location. No competition.
B. ELKMAN, Williams Bay, Wolfort Co., Wis.

FOR SALE—One Henderson cold tire setter, complete, same as new; never used any to speak of. \$75.00.
ALLEN P. ELY & CO.,
1110 Douglas St., Omaha, Neb.

FOR SALE—My shop and tools complete, also dwelling house. Good location. Wish to retire from blacksmithing. For information address,
C. F. HEYDE, Poe, Ind.

FOR SALE—My shop and tools complete. Best location in Central Illinois; no competition; cause for selling—owner wishes to retire from blacksmithing. For particulars, address
T. E. LARSON, Box 48, Perdue, Ill.

WANTED—We invite applications from those desiring steady employment, at good wages, as first class salesmen, machinists, wood workers, blacksmiths, painters and trimmers. Experienced men in wagon and carriage manufacturing. Address,
STUDEBAKER BROS. MFG. CO., South Bend, Ind.

FOR SALE—Blacksmith, wheelwright and hame shop, also complete set of tools. Located near Shrewsbury, York County, Pa., convenient to railroad. Also two dwelling houses, with two acres of land adjoining shops. Paying location, no competition. Owner desires to retire from business on account of age. For particulars address,
W. G. ALLEN, Shrewsbury, Pa.

FOR SALE—One No. 4 Egan Hub Mortiser and Borer; one No. 0 DeLance Double Drum Polishing Machine; one Lane & Boddy Sixty-ton Hydraulic Wheel Press; one Cam Press or Hub Press, power feed. The Mortising machine is supplied with two sliding tables, one for hub mortising, the other for plain mortising. Further particulars upon application to
NESS BROS. & CO., York, Pa.

BE AN EXPERT BLACKSMITH—By using Toy's Colored Tool Tempering Charts, A and B, explaining Scientific and Plain Tempering to Standard in Oil, Water or Tallow, showing true color each tool should be and tells what each tool will stand. These charts are same as are used by Woolwich Arsenal, England.

Also new treatise on all the new steels and seventy-five new methods and recipes for forging and welding on machine and plow work, all the secrets in plow making and repairing and ten new steel welding compounds for different kinds of steel, also Thermite Welding fully explained, it welds solid in the twinkling of an eye.

All the above for One Dollar. Samples free.
Forty years a factory steel worker.

W. M. TOY, Sidney, O.

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PROVIDENCE, R. I., U. S. A.,

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"SPRING" BRAKE BLOCKS

For Carriages, Wagons and Trucks

12 Sizes for Tires from $\frac{7}{8}$ in. to 5 in. wide. Wear shoes fitting these blocks adapted to either Steel or Rubber Tires.

MORGAN POTTER, Sole Manufacturer,

Catalogues and Prices cheerfully furnished.

FISHKILL-ON-HUDSON, N. Y., U. S. A.

Plow Lay Welding Machine and Leveling Block Combined

An invention to provide a novel, simple, efficient and economical method of welding and shaping all kinds of plow shares. Indispensable to every Blacksmith. Guaranteed to give satisfaction. If not satisfactory, money refunded. Send for Illustrated circular and prices. It tells the rest.

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Box A. 64

MARCELLUS, MICH.

The Crescent "Eveready" Plowshare

Extra Heavy and Smooth Upset Shin on all Plowshares.



SAVES TIME, PATIENCE AND MATERIAL

Can be fitted to plow easily, quickly. Are welded securely, point finished and fully ground and polished.

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HAVANA METAL WHEEL CO., HAVANA, ILL., U. S. A.

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Is a beautiful reproduction in twelve colors of a picture painted for us by Raphael Beck. A handsome picture for framing. If not a subscriber, take advantage of the above liberal offer while it lasts. Send \$1.00 now so you won't miss "The Village Smithy."

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that goes into your shop. Twenty pages of solid reading matter guaranteed each month from the brightest writers of the craft. No trade puffs or stale clippings.

SEND money by Registered Letter, Express Order, Stamps, or Money Order, but not checks.

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Trade Literature and Notes.

Empire Fifth Wheel Works, Quincy, Ill.
Small illustrated pamphlet of the roller bearing fifth wheel made by this firm. The advantages claimed for this roller wheel are ease of turning the same, cleanliness, freedom from oil and grease, saving in repairs on horse, harness and wagon. This fifth wheel can be put under any wagon without changing the old circles.

W. B. Eddy & Co., of Whitehall, N. Y., state that the following letter is a sample of hosts of similar letters which they receive regarding their ointment:

BARNESVILLE, O., March 30, 1903.

W. B. Eddy & Co.,

Find enclosed postal note in payment of one-fourth dozen QUINN'S OINTMENT. Seen it used on the worst cases of scratches and also a case of grease heel that I have ever known of and it cured them both inside of three days.

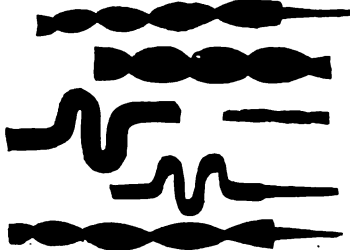
You may ship me one dozen bottles and all the booklets you can, as I would like to use them for advertising. Sold my last bottle today.

FRANCIS MOORE.

Cray Bros., 57-59 Water Street, Cleveland, Ohio, have sent us their latest catalogue (March, 1903). It contains 192 pages, illustrating and clearly describing their carriage and wagon material and tools. Pages 78 and 79 are of special interest to horseshoers.

H. L. Chapman, Marcellus, Mich., sends us a little folder showing their different styles of grinding machines, which they state are specially adapted for carriage-makers, blacksmiths, and cycle repair shops. These machines are useful for a large variety of purposes, and interested parties would do well to send for a full description.

The large losses yearly in shops where crucible steel is used for tool and die making, commends most strongly any method which may be devised for the purpose of preventing loss and breakage of milling cutters, lathes, planer tools, taps, dies, files, etc. The Ray Automatic Machine Company of Cleveland, Ohio, are marketing a product called Vulcan Annealing Putty, which they claim will anneal the hardest tool steel to such softness that it can be cut, bent, twisted or drawn into almost any shape without fracturing or injuring the steel



itself. The illustration herewith shows what can be done with steel after treating with Vulcan Annealing Putty. The treatment is very simple, consisting only in heating the steel slowly to a good cherry red, and packing it in the putty, where it remains until cold. This process it is stated will anneal Mushett or self-hardening steel so that it can be readily turned or machined. They also claim that hard cast iron may be annealed by its use.



Bowman's Horse Cough, Hoarse-ness and Indigestion Cure. A veterinary specific for wind, throat and stomach troubles. Strongly recommended. \$1 per can. Dealers, mail or Ex. paid. **Bowman Horse Remedy Co.** (S) Toledo, Ohio.



\$60. Back-geared screw cutting foot or power LATHES, made in large lots with special tools; swing ten inches over bed. Our ten years of manufacturing small lathes enables us to make a low price or a high grade tool. Write for guarantee, circulars and discount.
Carroll & Jamieson Machine Co.
BATAVIA, - - - OHIO.

"AND DON'T YOU FORGET IT."

Mohr's Blowers FOR BLACKSMITHS. . . .

Are guaranteed equal to any, are more convenient, require less room and have a wider range of adjustment.

CIRCULARS FREE.

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No. 5 Combined Punch and Shear



with 12-in. throat for punching 1 in., and a 12-in. blade for cutting No. 8 gauge metal, 2 x ¾ in. bars, ¾ in. round, weight 525 lbs. Made in 18 different sizes, from 240 to 2,200 lbs. We make a specialty of shears, punches and rolls. Tools for shearing, punching and bending sheet metal, bar iron and angle iron.

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The Original Air-Hardening Steel

and STILL UNAPPROACHABLE in general excellence.

Thirty Years' Experience in Engineering Works in all parts of the World has proved Beyond all Doubt that this Steel is in every respect

THE BEST TOOL STEEL

YET MANUFACTURED

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If a fast-cutting steel is required, this is the best and most reliable of this grade. It will do more work than any other known steel, and every bar is uniform and free of the "Cracking" so generally a feature in steels of this grade.

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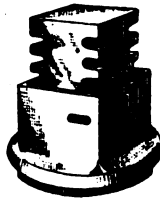
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PONTIAC HARDWARE
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BOX 102, PONTIAC, MICH.

Trade Literature and Notes.

We have just received a handsome booklet from the Featherstone Foundry and Machine Co. of Chicago, the subject of which is a complete description of their interesting new tool, the Pneumatic Forging Machine or Mechanical Blacksmith. Fine half-tone engravings illustrate the machine complete and in parts, as well as some of its work. The catalogue is worth reading.

The L. S. Starrett Co., Athol, Mass., have just published a new catalogue, No. 17. This booklet is of very neat design and most convenient arrangement. It contains 176 pages—whereas the preceding issue had only 112 pages. A number of entirely new tools are shown and new sizes and improvements in tools formerly made. This is an exceedingly fine catalogue of small tools for mechanics.

One of the most interesting devices in the way of carriage accessories which we have seen for some time is the spring brake block of which Mr. Morgan Potter, Fishkill-on-Hudson, N. Y., is the inventor and sole manufacturer. A novel feature of the same is that they may be fitted to rubber tires when desired. Any one interested in brake attachments will do well to write to the above for catalogue.

The new catalogue of the Geo. E. Watson Co. of Chicago, Ill., contains 118 pages, besides a full index. It describes the complete line of paints, brushes and painters' supplies manufactured by the company, with special reference to their "Faultless Paint Remover," which they claim "contains no alkali, potash, lye or other material which will eat into or stain the wood." This is a very interesting catalogue to the painter.

Your Hack Saw Troubles



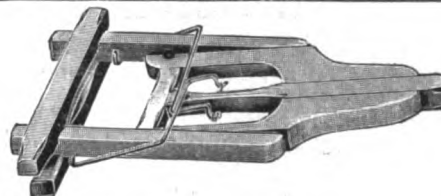
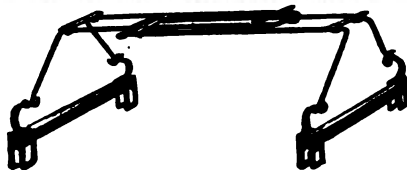
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FITS ANY STANDARD WAGON



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Special Price
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The book may be had in neat cloth binding for \$1.00 from the American Blacksmith Company, P. O. Drawer 974, Buffalo, N. Y.

"A Text-book of Horseshoeing," by A. Lungwitz, is a very valuable addition to the library of any horseshoer or veterinarian or, indeed, of any man who has to do with horses. It gives in a clear, concise form, the principles underlying the theory and practice of horseshoeing. A brief sketch of the anatomy of the horse (which is absolutely necessary to every horseshoer) is the opening topic. Numerous illustrations help the reader to clearly understand the text. The fact that this treatise has been translated from the German shows how valuable it has been deemed by authorities. The book in neat cloth binding, is published by J. B. Lippincott Company, and may be had from THE AMERICAN BLACKSMITH COMPANY, Buffalo, N. Y. Price, \$2.00, postpaid.

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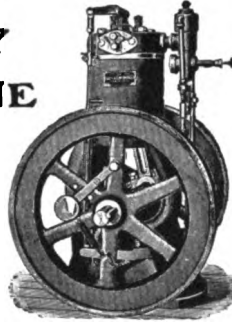
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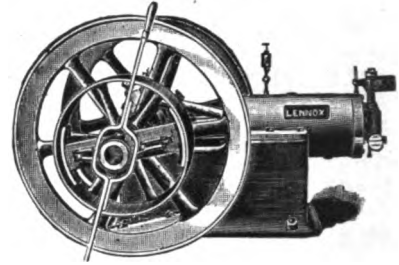
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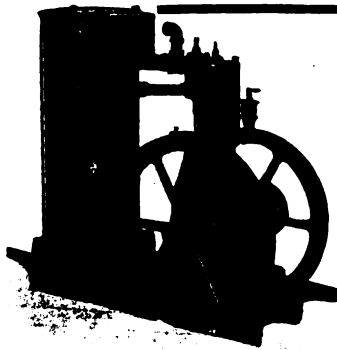


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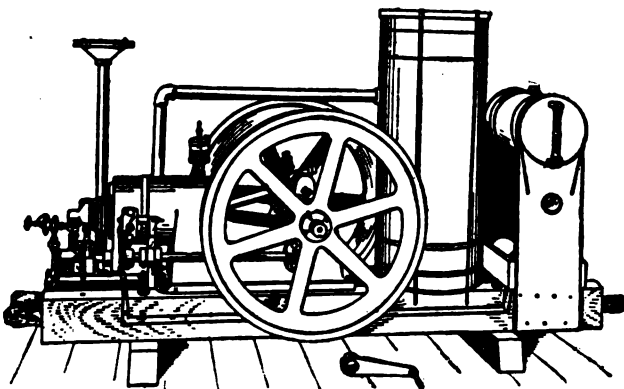
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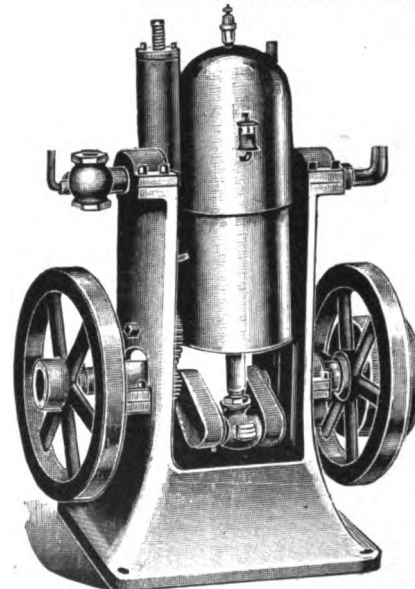
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Blacksmiths, Wagon builders and repair men should investigate the HERO. It saves you \$100 to start with, gives ample power and entire satisfaction.

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We don't expect you to buy on our representation, but want you to know about our really unequalled offer before placing your order.

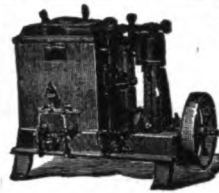
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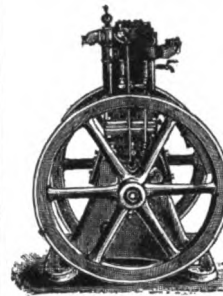
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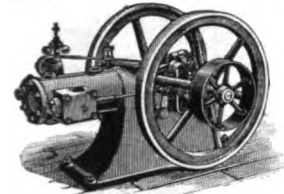
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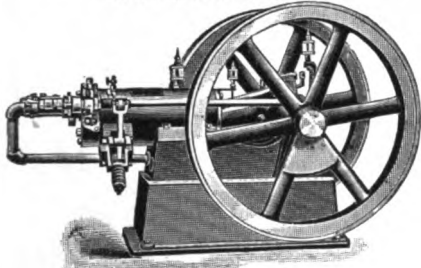
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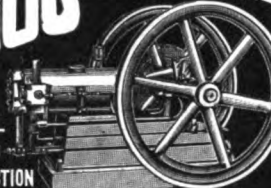
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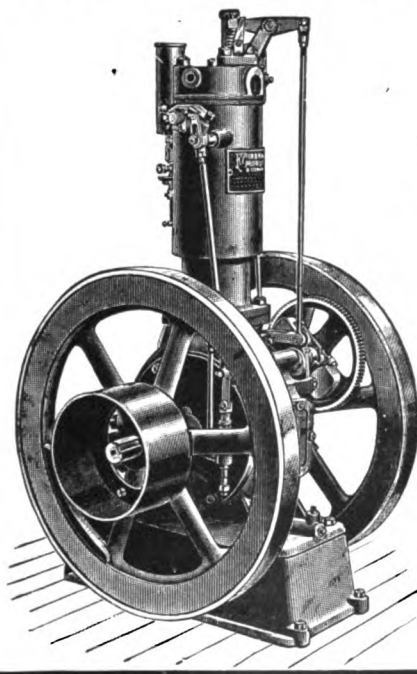
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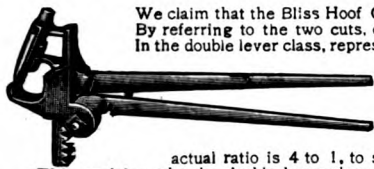
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ARE made from the best selected materials, in the most workman-like manner, and every one is warranted for two years . . .

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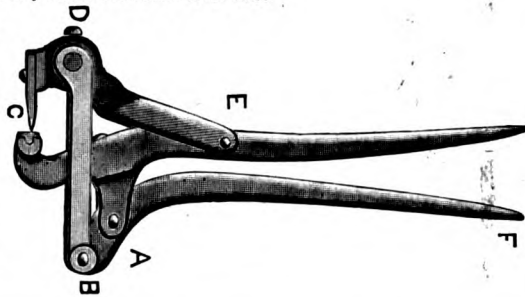
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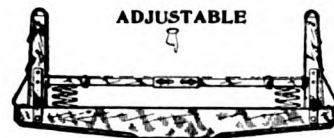


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Cheapest Bolster Spring on the market.



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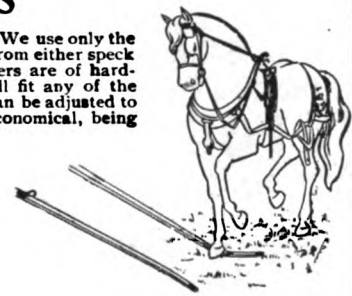
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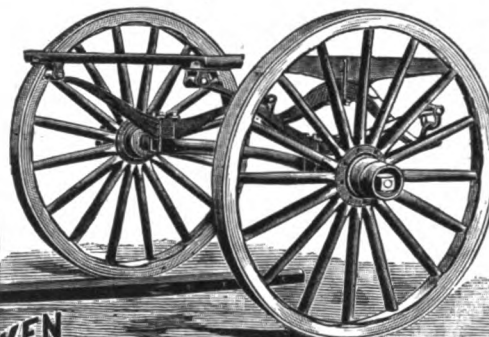
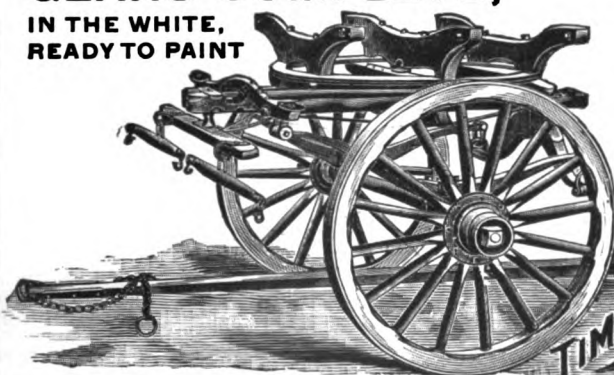


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Give us a TRIAL ORDER for a gross. This is a sure repeater.

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In writing for prices give full specifications and description of what is wanted, so as to enable us to make prompt quotations.

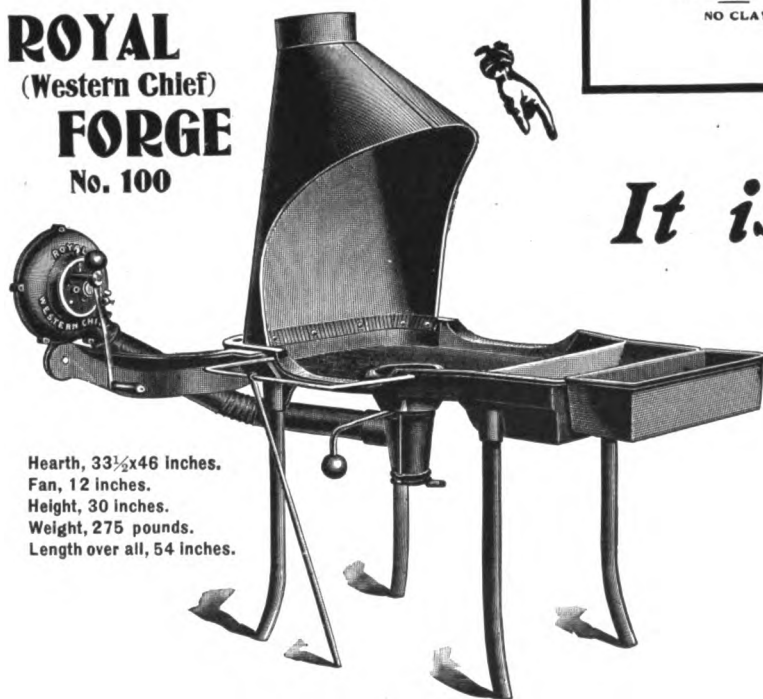
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ROYAL
(Western Chief)
FORGE
No. 100



Hearth, 33½x46 inches.
Fan, 12 inches.
Height, 30 inches.
Weight, 275 pounds.
Length over all, 54 inches.

Reliable
Our Choice
Your Choice
America's Choice
Leads Them All



The
ROYAL FIRE POT
— NO CLAY

HANDSOMEST: Because its constructive design is symmetrical, attractive and beautiful.

SIMPLEST: Because fan case and column stand (2 parts only) is about all there is of it.

BEST: Because made of the best material, by the best workmen and best mechanical experience that can be obtained.

SUPERIOR POINTS.

No Belts, no Clutches, no Ratchets.

The blower case oscillates on its bearing, permitting nose of case to point down or out or up, as may be desired; meeting any angle of blow pipe, thereby saving one elbow and 10 per cent. of blast force; besides valuable room occupied by other blowers.

The crank turns forward or backward, as suits the operator.

The gears are Phosphor Bronze and Steel, cut on the most scientific principle; they are flat, and straight cut (no spiral or worm gears); which combined with Steel Shafts and Composition Bearings made and assembled perfectly, run noiseless, and makes this the best blower in the world.

The Gear Case is oil tight and dust proof, permitting gears to run in a bath of oil.

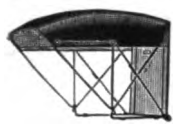
The Blast is very powerful, and as positive and steady as a power blower, and takes less labor to operate than others. The after blast is strong and lasting.

The Column Stand and Iron Base give a solid, non-trembling foundation. Therewith it takes less than any other blower.

*It is the way
they are
built that
pleases so*

MADE BY
Canedy-Otto Mfg. Co.
CHICAGO HEIGHTS, ILL.

SOLD BY
First-Class Dealers
EVERYWHERE



\$5.50

CASH
with Order or
C. O. D.

FULL LINE OF
CARRIAGE TRIMMINGS
AT LOWEST PRICES

RACINE BUGGY TOP COMPANY
RACINE, WIS.

**A NEW IDEA WAGON JACK FOR WAGON
MAKERS OR BLACK-
SMITHS DOING WAGON WORK.**

Easy to operate and cheap to make. A wheel can be made as true by any one as in the largest factory. Impossible to operate so that spokes will not be true. I will send sketch and directions how to make machine for two dollars (\$2.00). Any mechanic can make Jack from my sketch and printed directions. Send P. O. money order or draft in remitting.

Address **Gustav A. Beltz** RENVILLE, MINN.
BOX 315.



BOLT CLIPPERS.

CHAMBERS BROS. CO.,
N. FIFTY-SECOND STREET,
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EACH ONE GUARANTEED.

THE CHAMPION ADJUSTABLE BLACKSMITH TONGS

One set of these tongs will take the place of three dozen ordinary tongs. They will adjust instantly for $\frac{1}{2}$ to $1\frac{1}{2}$ -in. iron with a firm and parallel grip. Handles remain apart same distance on all sizes of iron. Price \$2.50 per set of three tongs.

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ON APPLICATION.



Queen City Metal Pattern Works 8 LOCK STREET,
BUFFALO, N. Y.

The Best Flux known for Welding

IRON TO IRON.



STEEL TO STEEL.

Cherry Heat

Sole Manufacturer

The Welding Compound Co.

PATERSON, N. J.

And MALLEABLE Iron to Steel.
SEND FOR SAMPLES (NO CHARGE),
CIRCULARS, PRICE LIST, AND NAME
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Only firm in this line awarded DIPLO-
MAS and GOLD MEDALS at CHICAGO
EXPOSITION, 1893, and OMAHA EX-
POSITION, 1896.

Climax Welding Compound



Welds all kinds of Steel as easily as Iron

Sample Free

For sale by dealers in Blacksmith's
Supplies.

Manufactured only by

CORTLAND WELDING COMPOUND CO.

CORTLAND, N. Y.

THE OLD RELIABLE

THE BLACKSMITH'S FRIEND

The No. 3 A, for welding axles, springs, steel tire and all kinds of welding—medium fine grain.

The No. 4, Banner Borax Substitute; sixty-five per cent. saving over Borax. Leaves smoother surface and a better weld for tools, scissors, etc. Does not loose off in the fire like Borax, fine powder.

The No. 5, for heavy, coarse welding, to be used in the manufacture of anvils, etc.—coarse grain.

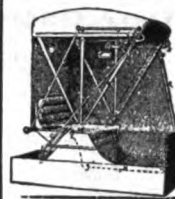
The No. 6 never fail toe-calk welding compound, the best for this purpose and general horseshoeing work—fine grain.

The Banner Welding Compound welds tool steel to common iron or tool steel to malleable iron very readily at a low heat. Guaranteed the best welding compound made or money refunded.

On receipt of \$2.00 from any blacksmith who has never used our compound we will ship 20 lbs. of any of the above numbers and make them a present of a fine leather apron to introduce our goods to the blacksmith. The apron alone is worth \$1.50.

SOLE MANUFACTURERS

THE CORTLAND SPECIALTY CO. CORTLAND, N. Y.
U. S. A.



THEY PROTECT YOU

From Inclement Weather.

JOYCE'S STORM CURTAINS
make buggy or phaeton as WARM
and DRY as a closed carriage. Hun-
dreds in use. Price is low. County
rights for sale. Liberal discounts to
agents. Send for particulars.

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Cropsey Ave.
T. H. JOYCE,
Brooklyn, N. Y.

Blacksmiths, Tool and Die Makers

*Did You Ever Have a Broken Die?
If so, what was the cause?*

Imperfect Annealing
of course.

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**VULCAN ANNEALING
PUTTY**

and avoid further
trouble.

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for de-
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cular and price
list. We guarantee
to save you 50 per
cent on your tool steel
work or money refunded.
Agents wanted.

The Ray Automatic Mach. Co.,
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The C. Z. KROH MFG. CO.

Toledo, Ohio. The oldest Top
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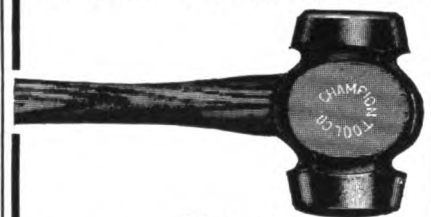
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Write for our Complete Catalogue of Up-
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GUARANTEED
SEND FOR
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**BANNER
welding
COMPOUND**

GEARS

\$4.50 to \$180.00

Akron Wagon Gears are sold in every State in the U.S., and are the best that time and skill can produce

800 to 20,000 lbs.

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A Monthly Illustrated Technical Journal circulating amongst Coachbuilders, Wheelwrights and Blacksmiths throughout the Commonwealth of Australia, New Zealand and South Africa.

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65 MARKET STREET,
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ESTABLISHED 1836

BEALS & CO. Iron, Steel and Hardware

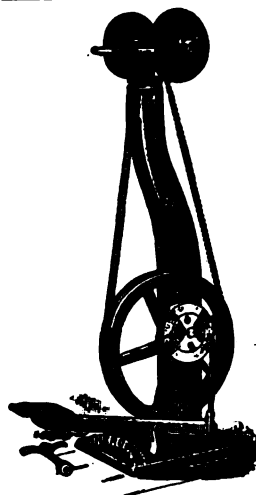
Tools and Supplies for Horseshoers
and General Blacksmiths
Carriage Hardware and Woodwork

44, 46, 48, 50 TERRACE, BUFFALO, N. Y.

HERO EMERY GRINDER

No. 10

THE ONE THAT GRINDS

No blacksmith can afford to be without one. Better than a power machine. Always ready. Ball bearings. Steel shaft. Steel chain belt. Wear for ever. Worth \$20.00. To Blacksmiths \$12.00. Freight paid to Chicago or equal. Guaranteed or money refunded.
ROBERTSON MFG. CO.
BUFFALO, N. Y.
Makers of Tools and Gas Engines for Blacksmiths.

LEE J. AUBRY CARRIAGE CO.

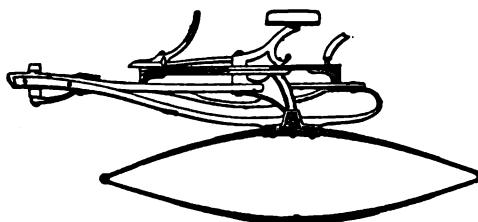
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Builders of all kinds of

COACH GEARS

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Tell us what you want, and you will get it. Write us at once.

HEARSE CARRIAGE GEAR
WITH IRON TOP BEDTo Owners of Gasoline Engines, Automobiles, Launches, Etc.
The **Auto-Sparker**

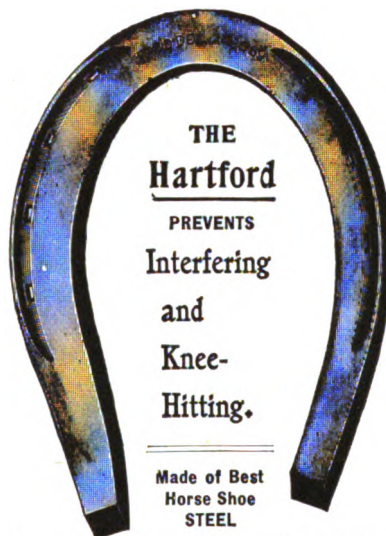
does away entirely with all starting and running batteries, their annoyance and expense. No belt—no switch—no batteries. Can be attached to any engine now using batteries. Fully guaranteed.

Write for descriptive catalogue.
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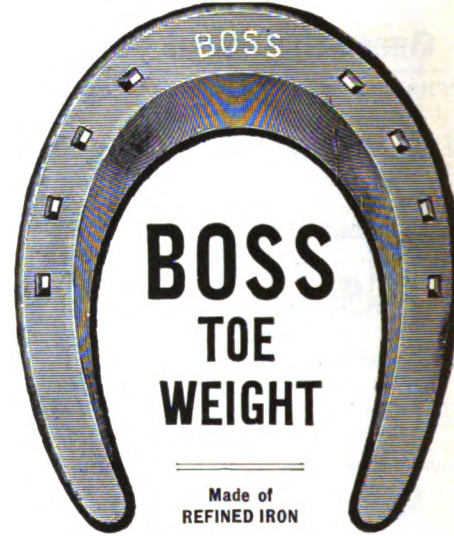
Lathes and Drill Presses

Especially for Blacksmiths and Machinists, also Hand and Power Planers and Shapers and Machinists' Supplies.

Catalogue M.

SHEPARD LATHE CO., 132 W. 2d St., Cincinnati, O.**THE Hartford**

PREVENTS

Interfering
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Knee-
Hitting.Made of Best
Horse Shoe
STEEL

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**BOSS
TOE
WEIGHT**Made of
REFINED IRON

Do You Use the best Side Weight and Toe Weight Shoe made in this country? If Not, Why Not? They cost you less labor and money and are superior to a hand made shoe. Carried by all leading jobbers. Sample pair of either size or weight mailed, postpaid on receipt of 50 cents. We make four sizes Nos. 1, 2, 3, 4. Three weights—Track, Medium, and Heavy.

THE SIDE WEIGHT HORSE SHOE CO.
MECHANIC STREET, HARTFORD, CONNECTICUT.

PROPRIETORS.
WM. WILHELM, A. R. KOEHLER.

HALF TONE PROCESS

WOOD & FINE WAX

ENGRAVING

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ELECTROTYPING

GIVE US A TRIAL

OUR FACILITIES ARE OF THE LARGEST

Buffalo Electrotypes & Engraving Co.

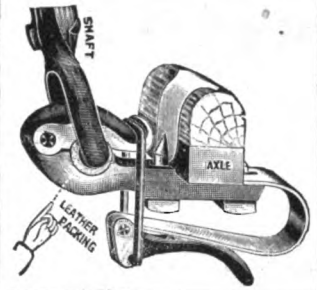
"TRINITY TRUE"

HIGH SPEED TOOL STEEL

PLENTY OF LATITUDE FOR HEATING. EASY TO MACHINE.
ESPECIALLY DESIGNED FOR HEAVY CUTTING.NO TRICK IN TEMPERING.
BEST STEEL FOR HOT WORK.**WESTMORELAND STEEL CO.,****PITTSBURG, PA.**

SEE THE LEATHER PACKING

The leather packing in the *Bradley Shaft Coupling* does the business—stops the rattle—lessens the friction and wear—and lengthens the life of the Coupling. In the *Bradley* only the leather packing wears, and the Coupling will perform the service for which it was intended as long as the carriage itself



THE BRADLEY SHAFT COUPLING

**C. C.
BRADLEY
& SON**
SYRACUSE, N. Y.

Something New!

Pride yourself on being up-to-date?
Then what your shop needs is a

Lancaster No. 401 Blower

Just out, with all the latest and best improvements.

**ADJUSTABLE TO ANY HEIGHT
AND AT ANY ANGLE**

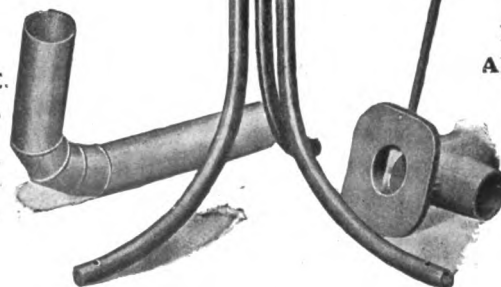
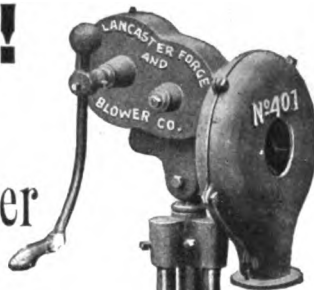
NO BELTS.

NO RATCHETS.

**NO SLIPPING
POSSIBLE.**

**ALL MOVING PARTS
ENCLOSED.**

OUR Forges are up-to-date, having valuable features, found in no other forges. Built for heaviest work. Furnished with our new ball tuyere and improved fire pot with centre and side blast, still friction clutch and ring-oiling bearings.



THE NEW BLOWER—LANCASTER No. 401.

If you want a blower that will last a lifetime and give solid satisfaction day in and day out, then you want a

Lancaster No. 401 Blower

It is made with ball bearings and spiral gearing, runs in oil and is the easiest working blower ever built.

Only the best material is used. The gears are accurately cut by machine, and all parts are carefully fitted. For compactness, adjustability, blast power, and light, frictionless running, this blower has no equal.

**NOISELESS, FRICTIONLESS
AND DUST-PROOF GEARING.**

Our New Catalogue is free
and tells all about it.

**Lancaster Forge and
Blower Co.**
BUFFALO, N. Y.

Buffalo Forge Company

MANUFACTURERS OF

Buffalo Forges and Blacksmith Tools



OLD RELIABLE BLACKSMITH FORGE.

3 SIXTY-TWO TYPES 3
or
BLACKSMITH, MACHINIST
BOILERMAKERS, TOOLMAKERS
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PROSPECTORS AND BRAZING
PORTABLE FORGES

A Complete Line of
PUNCHES, SHEARS, BAR CUTTERS
TIRE BENDERS
TIRE UPSETTERS, HAND BLOWERS
AND
BLACKSMITH DRILLS



No. 25 BLACKSMITH'S OUTDOOR FORGE.

WRITE FOR NEW BLACKSMITH MACHINERY CATALOGUE.

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BUFFALO, N. Y., U. S. A.



Every genuine "Hay-Budden" Anvil is made of the best *American Wrought Iron* and faced with best *Crucible Cast Steel*. Every Genuine "Hay-Budden" Anvil is made by the latest improved methods.

Hay-Budden

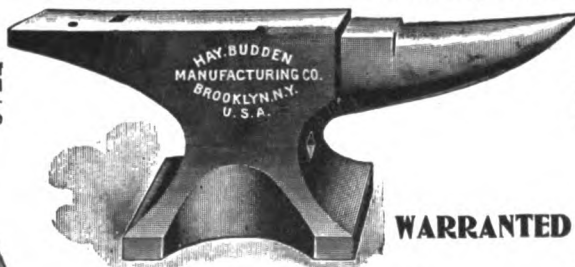
Solid Wrought

ANVILS

THE GOLD MEDAL ANVIL
HIGHEST AWARD

OMAHA, 1898

PAN-AMERICAN, 1901



WARRANTED

WEIGHTS FROM 10 TO 800 LBS.

OVER 80,000 IN USE

Experience has proved their worth and demonstrated that "Hay-Budden" Anvils are Superior in Quality,
... Form and Finish to any on the Market ...

HAY-BUDDEN MFG. CO.

254-278 N. Henry St., Brooklyn, N. Y.



PATTERNS—Regular Blacksmith, Farriers', Farriers' Clip Horn, Plow Makers', Double Horn, Saw Makers', Instrument Makers', Chain and Axe Makers', Etc., Etc. Etc.
Send for Descriptive Circular.



VOLUME 2

THE

NUMBER 10

AMERICAN BLACKSMITH

BUFFALO
N.Y. U.S.A.

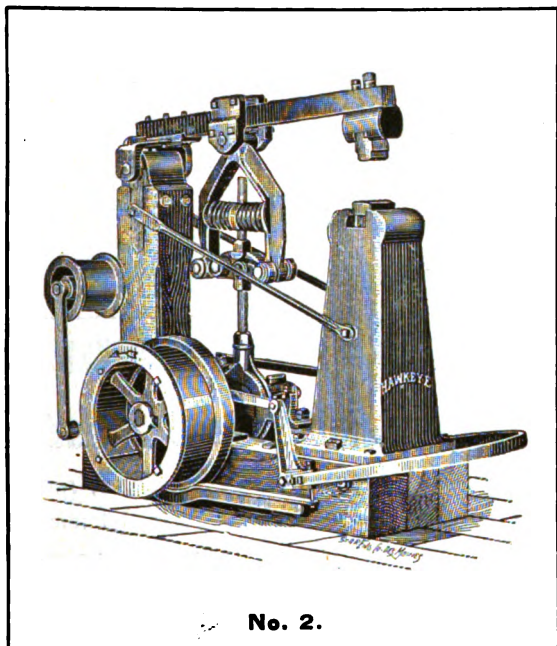
A PRACTICAL JOURNAL OF BLACKSMITHING

JULY, 1903

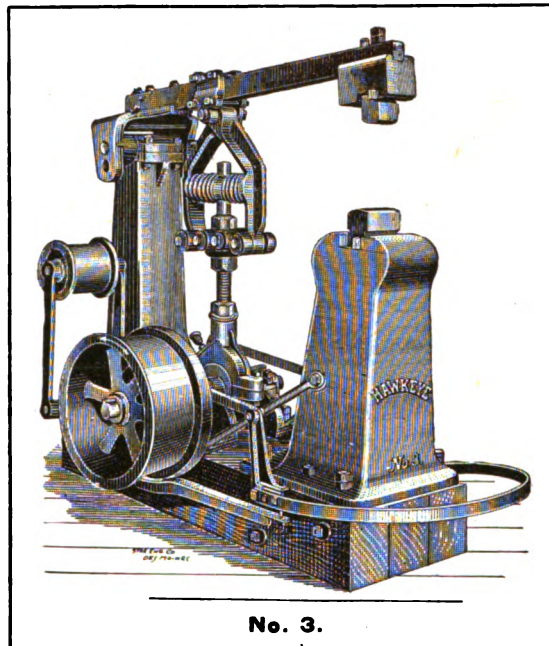
\$1.00 A YEAR
10¢ A COPY

THE HAWKEYE Power Hammers

ARE STANDARD AND THE LEADING MACHINES IN THEIR CLASS.



No. 2.



No. 3.

THEY HAVE BEEN ON THE MARKET FOR YEARS AND ARE FULLY GUARANTEED.

THINK OF THE LABOR THEY WILL SAVE.

NOW IS THE TIME TO BUY FOR SUMMER AND FALL WORK.

Mr. A. G. Boylan of Milo, Iowa, writes that he would not do plow work without the Hawkeye Hammer. In three days he sharpened forty-nine plow lays and made two new ones alone and our No. 3 hammer saves labor in proportion on heavy work.

REMEMBER THAT OUR HAMMERS ARE GUARANTEED TO STRIKE ONE-THIRD HEAVIER BLOW THAN ANY OTHER TRIP HAMMER WHICH IS SOLD AT THE SAME PRICE

Write for Prices and Full Information.

HAWKEYE MANUFACTURING CO.

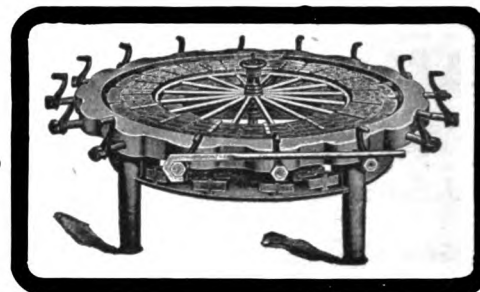
TAMA, IOWA

It Sets them Cold by Hand.

The Vehicle Repairer's Best Friend Is the

Henderson ^{Hand} ^{Power} Tire Setter

**Because it Sets Tires Cold, Keeps the Dish Just Right
and Tightens all Joints in a Wheel.**



***The Greatest Labor-Saving and Money-Making
Machine ever Offered Blacksmiths and Wagon Men.***

Made \$32 in One Day.

STAPLES, TEXAS, NOV. 19, 1901.
Gentlemen: The machine has done all and more than you claim it to do. It has been a money-maker for us. Has increased our trade and gave our customers perfect satisfaction. We could not do business without it. It is a great thing over the old way of setting tires; it has more than paid for itself. One day we made \$32 with the machine and I think it is one of the grandest things that was ever invented for blacksmithing. Respectfully,
LAWMAN & WILSON.

You don't have to remove any bolts or worry about the dish.

No complicated parts to get out of order. A thousand users endorse the Henderson.

The machine will draw trade, give you control of the tire setting business in your neighborhood, and **MAKE MONEY FOR YOU.**

Write for descriptive circulars and prices

STANDARD TIRE SETTER COMPANY

KEOKUK, IOWA, U. S. A.

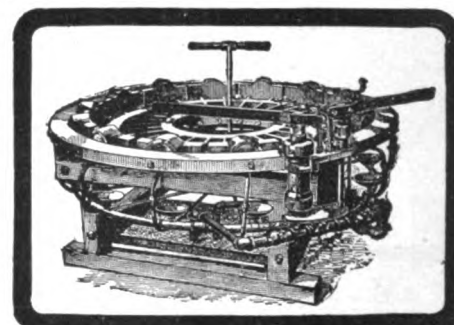
What They Think of Their "West" Tire Setter

TO THE WEST TIRE SETTER COMPANY.

NEW BEDFORD, MASS., April 15, 1903.

GENTS:—We have worked your Tire Setter for six years, and it has given us good interest on money invested, and has given entire satisfaction to every one of our customers, as it worked good on every job we have done with it. We have set tires 6 in. x 1 in., 5 in. x 1 ¼ in., 5 ½ in. x 1 in., steel tires and all smaller sizes, the first year, and which are, and have been, in use up to date every day carting rocks over good and bad roads without any sign yet of getting or being loose. We have set tires also on invalid chairs with ¾-in. round spoke, the wheels just fitting inside the ends of rams and did a very nice, good job, to the disappointment of eight spectators, who were present to see the little wheels get smashed by the big powerful machine, but "nit," as the machine has in all those six years NEVER hurt a spoke, rim or hub in any way.

The time we bought this machine we looked at the sum of money it cost as enormous (you know we have very few millionaire blacksmiths) but after sixteen months we had principal, interest and expenses back again, which is not found in every investment, besides saving a good many drops of sweat by not having to work so hard as the old way, let alone the time we saved. We don't advertise this machine in newspapers and other places, but let the machine do it by better work and less time, which counts for our customers as well.



CAUTION.

On March 31, 1903, The West Tire Setter Company filed a bill in the United States Circuit Court, Southern District of Iowa, against the National Machine Company, of Keokuk, for infringement of the West patents. USERS of infringing machines are warned that they are equally liable with the manufacturers.

If anyone in our section should want to see the machine work, or wants any information about it, you are at liberty to refer same to us, as we are willing to help them; we are ready and willing to live and let live. Yours,
FICHTENMAYER & FLYNN.

The West Tire Setter Co.
ROCHESTER, N. Y.

THE BROOKS TIRE MACHINE COMPANY.

(INCORPORATED.)

CAPITAL STOCK, \$100,000.

The Brooks Cold Tire Setter is the original edge grip machine and is improved right up to date. We lead and others follow.

Why is it that there has been more of these sold in the past two years than any other two machines manufactured? First of all, because the work pleases the blacksmith's customers and they advise their friends to take their work to him, and his business, as well as his profits, begin to grow.

It has two speeds and powers, one for light tires and one for heavy tires. By pushing the two short levers down, you force the grip keys in against the tire with a tension spring which gives additional pressure against the inner ends of the keys, forcing them to operate together, thus not having to use a hammer and punch to set the keys.

The machine is opened by simply turning one eccentric. No prying with a lever or crow bar to open the machine, in fact the machine is mechanically constructed in every respect.

Shipped on trial and fully warranted and if not as represented, we will pay the freight both ways. Let us ship you one on trial. Send for our terms and descriptive circular. Write us to-day.

The Brooks Tire Machine Company,
121 North Wichita St., WICHITA, KANSAS.

Azusa, California, July 23, 1902.

Brooks Tire Machine Co., Wichita, Kansas.

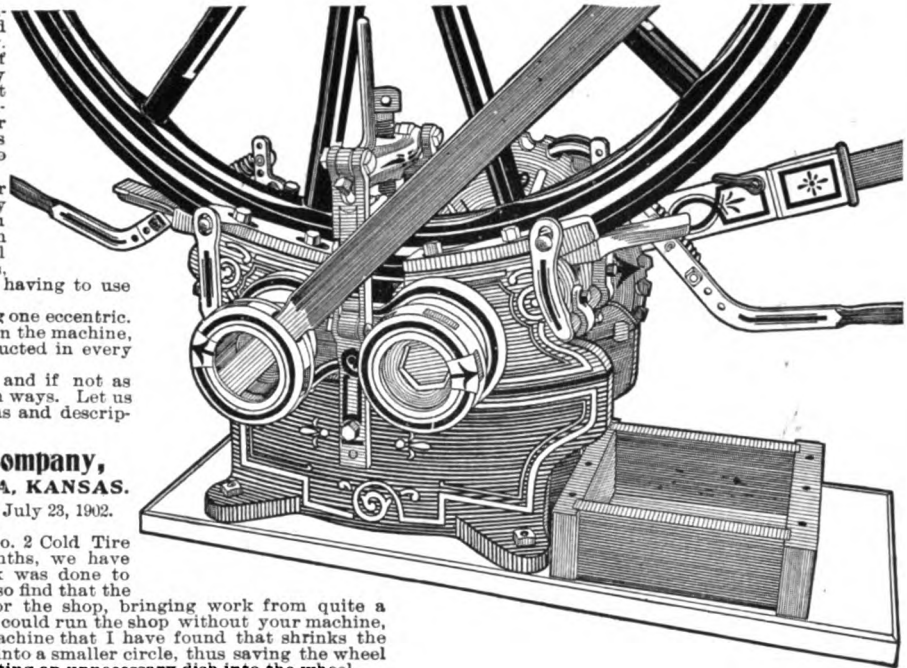
Gentlemen: Having had one of your No. 2 Cold Tire Setters in use in my shop the past four months, we have set a great many tires with it. The work was done to the entire satisfaction of our patrons. I also find that the machine has been a great advertisement for the shop, bringing work from quite a distance. In fact, we do not know how we could run the shop without your machine, after having once used it. It is the only machine that I have found that shrinks the tire without compressing the whole wheel into a smaller circle, thus saving the wheel from being crushed at every joint and putting an unnecessary dish into the wheel.

Wishing you success in your business and thanking you for the truthful way in which you have represented your machine to me, I am
Very truly,
R. M. SIPPLE.

Red Hook, N. Y., July 16, 1902.

Brooks Tire Machine Co., Wichita, Kansas.

Dear Sirs: In reference to my opinion of your Tire Machine, will say I had meant to answer earlier, but have been rushed with work and it was deferred from day to day. Another reason was, I wanted to be fully satisfied by trying all kinds of tires before committing myself, and now I can say for the Brooks Tire Machine, that I think it the best machine on the market and does all you claim for it and very quickly. I can set a tire with it better than any other way. I have between \$2,000 and \$3,000 worth of machines in my shops, and I would rather part with any of them than with my Tire Setter. Wishing you success, I remain, yours truly,
GEO. W. STORMES.



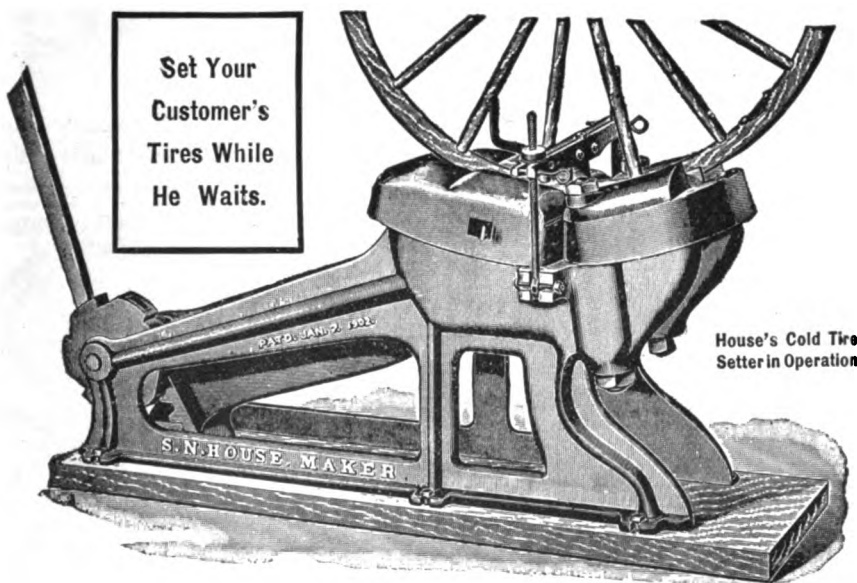
THE HOUSE COLD TIRE SETTER

ONE MAN Can Set
Four Tires
In Twenty Minutes.

NOT NECESSARY TO REMOVE
THE TIRES OR THE BOLTS

It Does Not Crush or Injure
the Wheel.

Set Your
Customer's
Tires While
He Waits.



House's Cold Tire Setter in Operation

You cannot afford to lose an hour taking off a tire and setting it the old way, for you can do it better with this machine in five minutes and save your fuel and bolts. It does not injure the tire nor woodwork, for it simply grips the tire on the edges in two places close together and shrinks it in a two or three-inch space, cold, just as we have been doing for years after they had been taken off and heated.

The grip keys are eight inches long, so they cannot scar nor cup the tire. The wheel is screwed down firm against the machine so that the tire cannot kink while setting. It sets them quickly and nicely, and it is the only machine that does. It is as simple and easily operated as the hot tire setters, made on the same principle, and will last forever. It is made of steel and cannot be broken; it weighs seven hundred pounds. Write at once for descriptive circular and price, which is very reasonable.

Will ship on trial. It is manufactured by

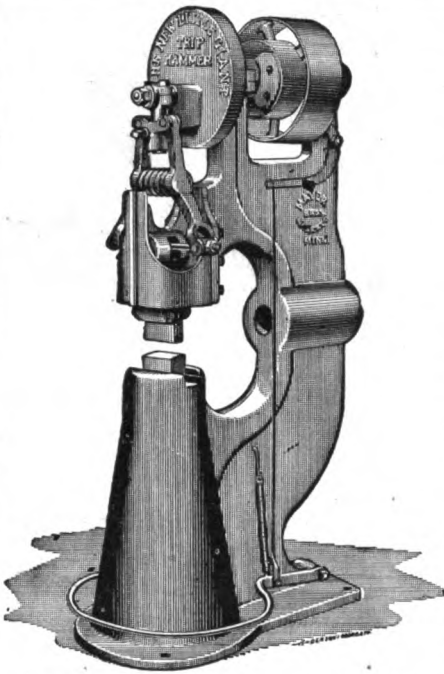
S. N. HOUSE, St. Louis, Mo.

**MacGowan & Flinigan Foundry
and Machine Co.**

SELLING AGENTS,

41, 42 AND 43
GAY BUILDING ST. LOUIS, MO.

SOLD ON TRIAL. 9 9 9 GUARANTEED TO DO EXACTLY AS
REPRESENTED OR NO SALE AND WE LOSE THE FREIGHT.



THE NEW LITTLE GIANT
U. S. PATENT, JANUARY 1, 1901
CANADA PATENT, AUGUST 20, 1901

550 NOW IN USE

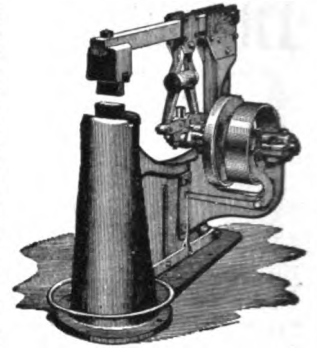
TRIP HAMMERS

NOW IS THE TIME TO BUY

A TRIP-HAMMER
Is the Blacksmith's
BEST HELPER

And Will. Pay for Itself

IN ONE YEAR



THE EASY
PATENT APPLIED FOR

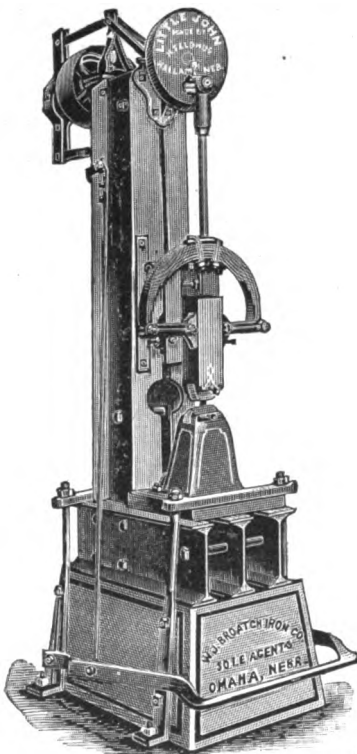
50 NOW SOLD

For Prices and Information

Write to

MAYER BROS.
MANKATO
MINN.

MENTION
THE AMERICAN
BLACKSMITH



Write for particulars.
Sole Agents,
W. J. BROATCH IRON CO.
OMAHA, NEB.

Made Expressly for the Blacksmith..

IF you want a power hammer, get one suited to your work,
The "**LITTLE JOHN**" trip hammer is specially made
for Blacksmiths. The PRICE IS SO LOW as to be within the reach of all.

A Strong Handy Hammer.

Will do any kind of blacksmiths' hammering, and is especially adapted
for plow work. By actual test the force is over 900 pounds.

THE FRAME

Is built of steel, not cast iron; cannot break,
come apart, or spring out of shape; it is
strong and solid.

THE ANVIL

Is firmly clamped to a steel base, and can be
replaced at a minimum expense. Many
Power Hammers have the Anvil and Frame
cast in one piece, and in case of damage to the
Anvil the whole becomes worthless.

THE DIES

Are made from the best steel. The bearings
are extra long and run in a good babbitt-
metal. The Guides are steel, and are adjust-
able to take up wear. The Pitman can be ad-
justed to different classes of work.

THE HAMMER

Is fitted with friction clutch pulley of the
best make. This Hammer will sharpen a 14-
inch plow lay in from two to four heats and
will do any kind of plow work. A piece of
iron 1 1/4 inches square, 5 inches long, has been
drawn out to 25 inches by this Hammer in
one heat.

Hand Forged Butcher Knives

Ground, Tempered and all ready for the handles, either round or riveted, for **15 cents each** or **\$1.50 a dozen**. All sizes from 5-inch to 8-inch. These Blades are made from Sanderson Steel and warranted. Will replace any imperfect knife with two new ones. Handles all ready to put on, **one cent each**. Hand Forged Razors, ready to use, 40c. each; Pocket Knife Handles, in great variety, 10c. Try a sample. *Hundreds of Smiths are using these blades and make money and friends selling them. Liberal discount in quantities. Address*

WOODWORTH KNIFE WORKS, - NUNDA, N. Y.
ESTABLISHED IN 1876.

Bolster Springs

ALSO WAGON SEAT,
TRUCK AND PLATFORM SPRINGS



Sold by leading Jobbers, or write us

HARVEY SPRING CO.
RACINE JUNCTION, WIS.

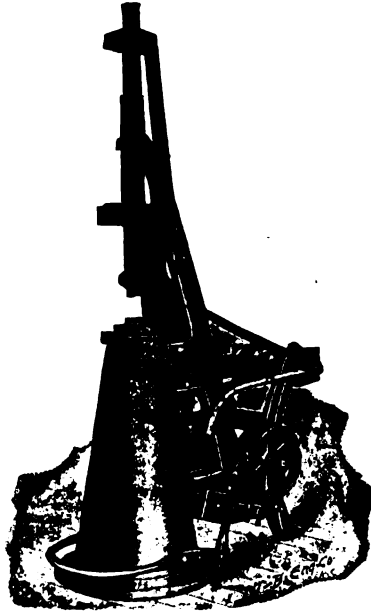
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The 20th Century Power Hammer.

Powerful, durable and capable of a large range of work.

A Labor-Saving Machine that Should be in every Blacksmith Shop.

Strictly guaranteed to do a wider range of work than any other trip hammer of its size on the market. It will successfully forge from $\frac{3}{8}$ -inch to 3-inch round or $2\frac{1}{2}$ inch square iron.



"The only hammer that can be raised and lowered five inches instantly while in operation, without tool or wrench. It will strike the same blow five inches above the die that it will directly on the die."

It is especially adapted for plow work and will successfully sharpen a plow lay from heel to toe.

Under date April 8, 1903, George Parker, of Onawa, Iowa, writes: "The hammer can't be beat. I have handled a number of them and think I am a judge of good hammers."

Solomon, Kansas, May 18, 1903.

KREHBIEL MANUFACTURING CO.,
Moundridge, Kansas.

Gentlemen—I have been using one of your hammers since March 11 and can recommend it to any one wishing a power hammer. I can do all kinds of work with it on account of its raising and lowering device, which makes it certainly the best hammer on the market today.

I have worked with other hammers and can say that this is the only hammer that stands firm and don't wiggle about when in use.

Yours respectfully, W. H. BUTCHER.

THE BEST HAMMER ON THE MARKET FOR GENERAL BLACKSMITHING. . . . WRITE FOR TERMS.

The Krehbiel Manufacturing Company,
MOUNDLEDGE, KANSAS.

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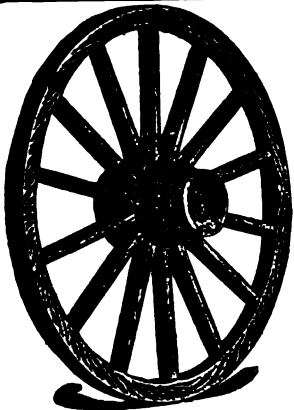
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This book gives Circumferences of Circles by eighth inches up to twenty feet, weight of Rectangular Iron, Round and Square Bar Iron, Angle and Sheet Iron, and other miscellaneous tables. **CLOTH BOUND. PRICE, 50 CENTS.**

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For Express and lumber wagons and they are

GOOD ONES TOO.

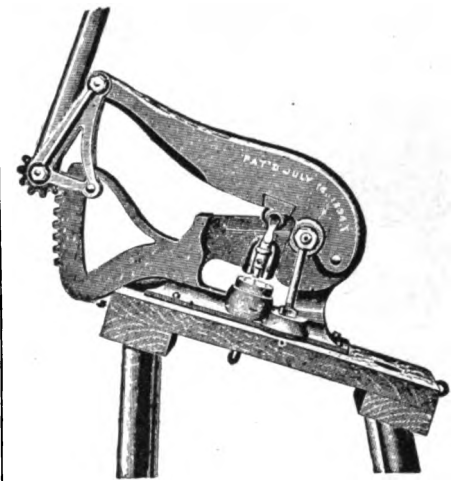
Send us a memorandum of the number sets you want, give size spoke, size hub, width of felloe, and height, and we will quote you price. If wanted with tire on them, give thickness of tire.

We are prepared to furnish new Carriage Wheels with rubber tire on them or can rubber tire your old wheels. See our **Net Price Catalogue of March, 1903, page 182.** This catalogue is sent on application to those in the Trade and will show you how to save money in all lines.

CRAY BROTHERS
CLEVELAND, OHIO.

"Can't Do Without It" says the blacksmith with a Sears Blacksmithing Device

Combined Punch and Shear and Round Iron Cutter



THE Sears Blacksmithing Device, cut of which we present, is the most convenient tool in use. In using it the operator stands in front of the device, and can with ease handle the machine with one hand, leaving the other free to hold his work, giving him a full view of the work as it is done. This is a very commendable feature, especially in such work as trimming plow points, etc.

This tool weighs 250 lbs., and is mounted on heavy stand, covering 1 x 3 feet floor space.

It will punch a $\frac{1}{2}$ -in. hole through $\frac{3}{8}$ -in. iron, $\frac{3}{8}$ -in. hole through $\frac{3}{4}$ -in. iron, and is provided with the following sizes of punches:— $\frac{3}{16}$, $\frac{1}{4}$, $\frac{5}{16}$, $\frac{3}{8}$, $\frac{7}{16}$, $\frac{1}{2}$, and these punches are furnished with each machine. It will cut $3 \times \frac{1}{2}$, $4 \times \frac{7}{16}$, $5 \times \frac{3}{8}$ in. cold iron and will cut plow steel. It will cut any size bolt or bar up to $\frac{3}{4}$ -in.

With each machine is furnished all the punches, dies and tools necessary for the work and each one is guaranteed.

For Sale by all Jobbers Send for Catalogue
GEORGE SEARS & CO., CLINTON, Iowa.

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THE MOST IMPROVED RUBBER PAD
OF ITS KIND.

ORDER BY NAME "A. C." THROUGH YOUR
SUPPLY HOUSE.

Consolidated Hoof Pad Co.

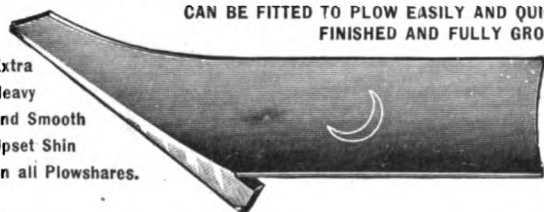
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It Saves Time and Material and Hence Saves Money.

The Crescent "Eveready" Plowshare

CAN BE FITTED TO PLOW EASILY AND QUICKLY. ARE WELDED SECURELY, POINT
FINISHED AND FULLY GROUND AND POLISHED.

Extra
Heavy
and Smooth
Upset Shin
on all Plowshares.

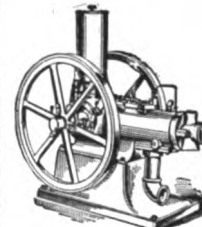


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Steel Lister shares, Subsoilers, Cultivator
Shovels, Landsides, Moldboards from
Solid, Crucible and Genuine Soft Center
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THE MIETZ & WEISS
Gas and Kerosene Engine

ADOPTED BY UNITED STATES AND
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Highest Award for Direct Coupled
Kerosene Engine and Dynamo,
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Burns Kerosene. Cheaper
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Automatic. Simple. Reliable.
For Pumping, Electric Light-
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Direct Coupled or Belted Dynamo
Sizes from 1 to 60 H. P.

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BLACKSMITHS, HORSESHOERS, WHEELWRIGHTS:

With the present high living expenses and cost of stock, are you not in favor of higher prices for work? Will you support
a movement in your county to raise prices, and also to secure a State Lien Law? Read the Association articles in each issue of
THE AMERICAN BLACKSMITH. See page 191.

Fill out and send in the blank below. Send also the names and addresses of every smith in your county, so we can get them
interested.

American Association of Blacksmiths, Horseshoers & Wheelwrights,
P. O. Drawer 974, Buffalo, N. Y.

I am in favor of a State Lien Law and higher prices for work, and will lend my support.

I enclose \$1.00 in payment of a year's subscription, beginning June, 1903, to THE AMERICAN BLACKSMITH, the official
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Please send me your plans of forming local County Associations. I send a list of smiths in my county.

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Town.....

County.....

State.....

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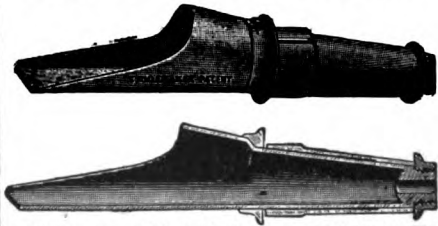
The American Blacksmith presents free to every person subscribing before Aug. 1, a handsome reproduction in twelve colors of "The Village Smithy," painted expressly for The American Blacksmith, by Raphael Beck.

Send a dollar now for a year's subscription with a copy of the picture. The edition is not endless. As a special inducement for new subscribers, those who send their order during July will receive as a premium, either a Handy Bench Level, or a Farrier's Hoof Knife, in addition to the picture. Send your subscription now before the matter slips your mind.

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Patent Wrought Steel Skein.



It is our claim that the STUDEBAKER WROUGHT STEEL SKEIN is the best in the world. During our manufacturing experience of some twenty years, we have made six hundred thousand sets of these skeins, with a total breakage of less than one tenth of one per cent. This fact and the further fact that we are imitated by all competitors, bears us out in our statement. Our points of superiority are as follows:

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2. It is the only skein with a solid extension back of the collar, keeping the wet and grease from working in on the axle.
3. The extension back of the collar covers all the tapering portion, and more of the wood of the axle than any other skein; prove it by measuring the inside of the skein.
4. By reason of this extension and shoulder on the skein the collar is prevented from slipping back or turning around on the skein, as it does on all other steel skeins.

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ARE SHOWN IN

"The Tool Catalogue"
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CORRESPONDENCE SOLICITED.

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A SAFE and POSITIVE CURE for Spavin, Splints, Ours, Ringbone, Bony Growths, Rheumatism

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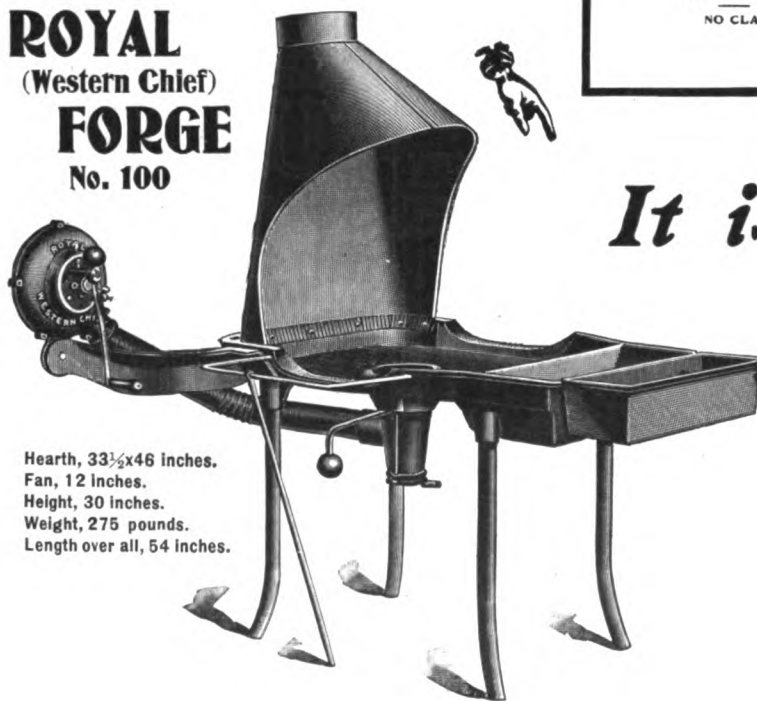
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Hearth, 33½x46 inches.
Fan, 12 inches.
Height, 30 inches.
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America's Choice
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ROYAL FIRE POT
NO CLAY

HANDSOMEST: Because its constructive design is symmetrical, attractive and beautiful.

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BEST: Because made of the best material, by the best workmen and best mechanical experience that can be obtained.

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No Belts, no Clutches, no Ratchets.

The blower case oscillates on its bearing, permitting same of case to point down or out or up, as may be desired; meeting any angle of blow pipe, thereby saving one elbow and 10 per cent. of blast force; besides valuable room occupied by other blowers.

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The Blast is very powerful, and as positive and steady as a power blower, and takes less labor to operate than others. The after blast is strong and lasting.

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they are
built that
pleases so*

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Canedy-Otto Mfg. Co.
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EVERYWHERE

BUFFALO HAND BLOWERS

Most Improved and Powerful Hand Blowers Made.

—RUNS IN OIL—

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4

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READ THE VERDICT!

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General
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Repairing of
All Kinds
Promptly Done

Practical
Horse Shoeing

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Dec 2nd 1902.

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P. S.—I have had 35 years of experience.

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Strong and
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Action
Smooth.

Operation
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No Lost
Motion.



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Buffalo Forge Company

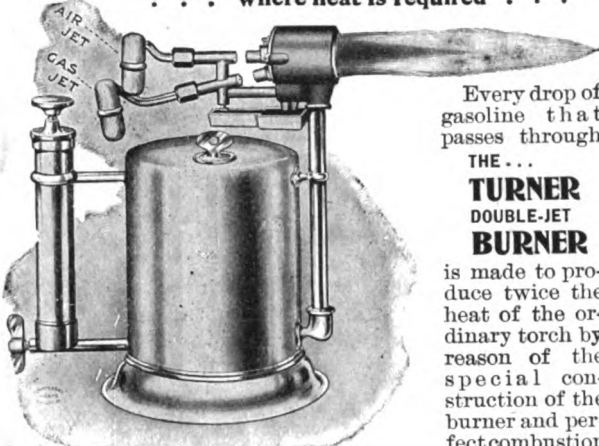
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FOR SOLID RUBBER TIRES
MADE EASY WITH

The TURNER Double Jet Gasoline Torch

The highest degree of mechanical heat is obtained from
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TURNER DOUBLE-JET BURNER

is made to pro-
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heat of the ordi-
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reason of the
special con-
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burner and per-
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of air and gas.

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We Make Good Wheels

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We fill Orders
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Special Price
on
Rubber Tires.

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LIGHT Vehicle Wheels

as manufactured by us are held up for the world's
criticism. We make ALL KINDS, painted ANY
& & COLOR, or, IN THE WHITE. & &

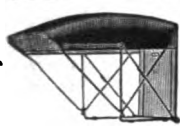
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We make a SPECIAL WHEEL, tired with ¾-in.,
⅞-in., and 1-in. Steel Tire that is a winner.

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\$5.50 CASH with Order or C. O. D.
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800 to 20,000 lbs.

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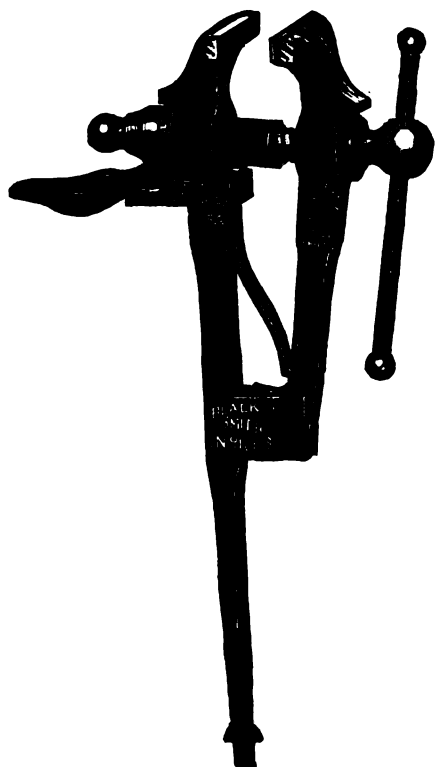
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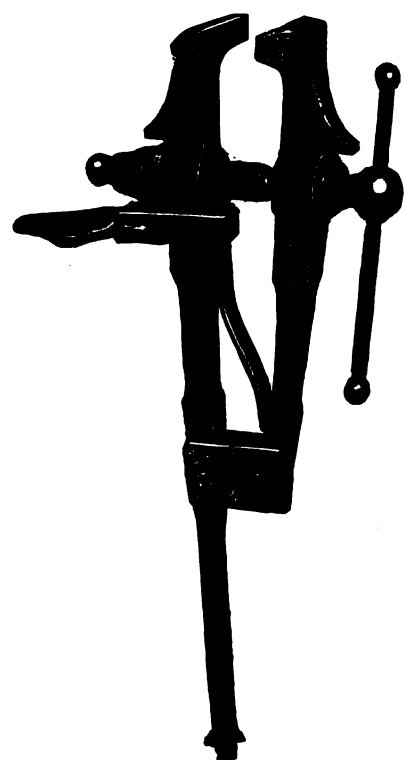
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THE AMERICAN BLACKSMITH

A PRACTICAL JOURNAL OF BLACKSMITHING.

VOLUME 2

JULY, 1903

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National Railroad Master Blacksmiths' Convention.

At Buffalo, August 18th to 20th, will be held the eleventh Annual Convention of the National Railroad Master Blacksmiths' Association. Prospects are bright for a largely attended and most interesting convention. No member should miss it. Blacksmiths who are eligible for membership, foremen of railroad, car and locomotive smith shops, and who contemplate joining this splendid association for mutual and craft advancement, should lose no time in communicating with the Secretary, Mr. A. L. Woodworth, Lima, Ohio, regarding early membership, and should by no means miss making the trip. Buffalo, Niagara Falls and the Convention form a combination of attractions for a summer jaunt, which is rarely excelled.

Rubber Tiring a Profitable Line.

Attention is directed to the short article on rubber tire work in a following column of this issue. This is a most interesting class of work, and we should like to hear from others of our readers, as to their practical work-shop experience in putting on and repairing rubber tires.

The mechanic who has an eye to business will anticipate the wants of his customers. Opportunities for increasing the profits should always be watched for. The repair of rubber tires is a line which a number of AMERICAN BLACKSMITH subscribers have taken up, and which pays them well. Have you yourself thought whether there was any chance for profit in rubber tire work? Are there enough rubber tires in your vicinity to make it worth while? It pays also to be the first to take up a given line of work in any locality.

Carriage Builders' National Association.

Official notification has been issued for the thirty-first annual meeting of the above association, to be held in Boston, Mass., during the week commencing September 20th, 1903. At the same time and place will be held the annual exhibition of vehicle and automobile parts, models, new inventions, harness, horse equipments and materials pertaining to the carriage, wagon, automobile and accessory industries. The largest hall in Boston has been secured for the purposes of the exhibition. Full details regarding membership in the Association and representation at the Convention can be secured by addressing the Secretary, Henry C. McLear, Wilmington, Del.

The American Blacksmith Offices Burned Out.

Fire destroyed the offices of the THE AMERICAN BLACKSMITH Company on the evening of June 19th. The subscription lists were saved entire, and as the printing plant was untouched, publication of the paper will continue uninterrupted. The paper will continue on the same lines as heretofore, with the determination to make it a better journal for blacksmiths of all classes than before. Suggestions from readers as to how the paper may be made of greater value to them thankfully received.

On page XIV we take occasion to

thank the many friends who have sent us their regrets, together with many kind offers of assistance, all of which we very much appreciate.

New and roomy quarters have been taken in one of Buffalo's finest office structures, the Mutual Life Building, where our facilities will be greatly improved.

Personal Magnetism in the Horseshoer.

Perhaps no craft affords a better chance for the cultivation of that peculiar quality, called personal magnetism, than horseshoeing. By this is meant the power to influence and lead intelligent things (people included) by sheer force of character.

The successful wild beast tamer possesses this magnetism to a very great degree. But even a dog-trainer, a horse-trainer, or a good rider, must be able to exert unworded authority and to inspire the sense of submission in animals. No man who is afraid, even slightly afraid, of a horse, can ever hope to influence him. The timid rider is always coming to grief, so with the timid horseshoer. The horse knows something about human nature. He feels instinctively who is to be master, and, if allowed to rule, will play the tyrant to the highest degree of perfection.

It is not at all necessary to be cruel, or even unkind, in order to inspire respect in the horse. In fact, kindness, with force behind it, is the surest means of attaining this end. The man who unflinchingly takes up the foot of a vicious horse and places himself at the animal's mercy, shows considerable courage and self-confidence which the horse is the first to appreciate.

The Scroll in Wrought Iron.

Scroll designs in ornamental wrought iron may be executed in almost endless variety, to suit either a heavy, massive piece or a lighter one. The two designs given herewith, both embrace the scroll, but are, yet, entirely different

in style. In the first, a very harmonious effect is secured by adapting the slender bars of the gates below to fill in the arch, fan-fashion. In the second, the scroll is rather more elaborate, and is very artistically combined with the hollow ring.

Photograph No. 1 is a wrought iron entrance to the Lying-in Hospital, 18th Street and Second Avenue, New York City, Mr. R. H. Robertson, Architect. Richey, Browne & Donald, Long Island City, N. Y., executed all the ornamental iron work throughout this building, such as stair-work, elevator enclosures, grilles, guards, etc. Photograph No. 2 is a wrought iron stair rail and newel at a private house in Scarborough, N. Y., Messrs. McKim, Mead & White, Architects. All the ornamental iron work throughout this private residence was also executed by the above firm.

Pointers on Wheel-making—1.

JOHN MILLIGAN,
Teacher of Carriage Building, Durham
University, Newcastle, England.

Hubs.

The timbers that are to be used in wheelmaking should be well and carefully selected. The nave or hub, which is sliced from the limb of a tree, should be as nearly as possible the size required in its natural growth, so that it will require little reduction beyond what it receives in the lathe in bringing it up to the true circular form. The reason of this is that the annual rings which mark the grain of the timber should be as little disturbed as possible, as they are not all of equal strength and durability. The outer rings are pretty strong, but as they get nearer to the centre, the wood is much softer. If, then, this outer hard casing is cut away, it is signing the death warrant of the nave, for the interior parts of the timber are not nearly so capable of resisting the destructive influences around, and in a very short time they will become completely soft and rotten.

In seasoning, the hubs are cut from the limbs of trees after having been allowed to lie twelve months, into lengths of ten or twelve inches, and the bark removed. By removing the bark, drying is greatly facilitated, and for internal drying, a hole should be bored completely through the centre, care being taken to remove the pith, as, if

this is left on one side of the centre, the nave is liable to split in seasoning. The ends should have a coat of paint, or be covered with some air resisting substance, such as resin, or a mixture of boiled oil and tallow may be substituted.

The greatest care should be exercised in storing naves for drying, in a perfectly dry place, neither too light nor too dark. They should be placed on their ends in rows separated by strips of timber, and turned over once every three months. The time required for seasoning a nave thoroughly, varies from one to two years, according to the conditions to which it is subject.

Spokes.

The tree is cross-cut into lengths

in this way is from eighteen months to two years.

Felloes.

Ash, if felled in the winter months, is exceedingly durable, and, as in the case of spoke wood, is benefited by being left in the round for a short time only. The tree is planked and cut by a saw to patterns or templets of the required curve, the grain in all cases running with the length. Two felloes are sometimes cut at one operation. The sizes in the rough vary from 14 inches long by 1½ inches by 1½ inches to 2 feet 4 inches by 3 inches by 3 inches. For seasoning, felloes are treated in the same manner as spokes.

Bent rims, which are used in America and frequently in England in place of sawn felloes, are made of hickory or ash. These are cut into lengths of the required size, and planed, after which they are steamed from thirty minutes to an hour and a half, according to size. They are then bent four at a time in a machine.

They are allowed to remain here until properly set, when the ends are strapped together to prevent opening, and are then stored for drying.

It is of great importance that wheel wood should be thoroughly seasoned; as, if worked up in an unseasoned state, the tenons of spokes become too small for the mortises, the nave or hub shrinks and the tire works loose and requires resetting. For rapid seasoning heated rooms are frequently used for storing the timber; but besides splitting, the wood is weakened by this process. In America, and sometimes in England, wet timber is boiled or steamed, before being seasoned, and by this means the

drying may be accelerated, although I am of opinion that the timber is less durable when so treated. There are also several other methods of seasoning timber by carbonic acid gas, chemicals, etc., but there is no method better than the natural one.

Construction.

A hand-made wheel is fast becoming a thing of the past, as some part of every carriage wheel used at the present time is more or less the production of machinery. Before the advent of machinery the craft of a wheelwright was one of some importance, and demanded a great deal of mechanical skill and knowledge. The timber was all

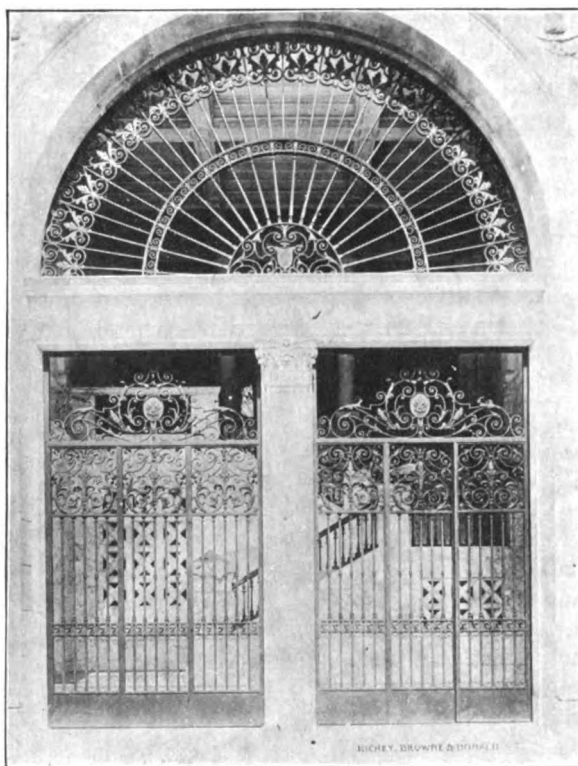


FIG. 1. ONE OF RICHEY, BROWN AND DONALD'S ARTISTIC WROUGHT IRON GATES.

varying from about 1 foot 8 inches, to 2 feet 4 inches, and this is better done a short time after felling. Cleft or riven spokes are better than those that are sawn, as the grain is preserved throughout the whole length. In cleaving, the log is split longitudinally by wedges, and marked off in a series of wedge-shaped divisions, these being cleft out with a large knife. The spokes should then be piled or stacked in the open air, protected from sun and rain. After drying nine months in this way, they should be transferred to a dry shed, and there stored until thoroughly seasoned and ready for working up. The time occupied in seasoning a spoke

cleft and sawn from the tree by hand; the spokes, felloes and stocks were formed by hand, and with tools of a primitive description, yet these wheels were very durable, although the work of the hand is in a great measure uncertain, when compared with the mathematical accuracy of a machine.

Today the spokes are formed, tenoned and polished by machinery; the stock is turned, bored, and mortised by machinery; the felloes are cut, shaped, planed and bored by machinery; but with all these advantages, it is a fact that hand made wheels sometimes outlast those made by machinery.

The proportions of a wheel are questions of grave importance, as, if too light, it will not support the weight resting on the axles, and, if too heavy, the draught is increased by adding to the weight of the carriage, though the increase is but trifling.

(To be continued.)

The Use and Application of Solid Rubber Tires.

A. J. YEAGER.

My experience with rubber tires extends over a period of five years. In that time, I have come into contact with all the different makes. When I first started I paid \$50.00 and freight from New York for my first tools. I could have made those tools for less than the freight. The mode of fastening rubber tires into the channels then was by two wires running through the rubber and fastened together by twisting the ends. The Kelly Springfield people used the electric welding process. But we were too far from the center of rubber-tire business to pay \$100 per year for the use of an electric welder. After we had the wires twisted and the rubber ends together again, we put the tire on the wheel with a tool made for the purpose of springing them over the channels. Of course a tire put on that way was nearly always loose.

The Kelly Springfield people however, soon put a stop to this two-wire business, claiming an infringement on their patent. Manufacturers of solid tires then began to look around for some other way to fasten tires. I was informed that my tools were no good any more, as we could not get tires of that make, but that we could get a tire that had a flat band running through it, which was simpler to mount, and the tools only cost \$15.00. We got those

too, and started to sell tires as fast as we could so as to get our money back before that way of mounting went out of style again. That style worked very well for about a year, when the flat bands began to break, and the tires would come off and often be lost. In order to pacify the people, we would, where they had the tire, put the same on again without charge. But before we lost all of our tire business, there came a reaction, and the two wires came back as the only good and the best way to fasten rubber tires into the channels. Litigation was begun which finally settled down to the Good-year Tire & Rubber Company and the Kelly Springfield Rubber Tire Co. When the Kelly people lost their patent claim, the two-wire fastening was thrown open to the world. Now it was a case of prices and who made the best compound. (Compound is the name of rubber in the rubber tire parlance.) Of course they all made the best when

fault of the man that put the tire on the wheel. Sometimes when a tire is on loose and becomes wet, the ends will come apart for a space of from two to eight inches and the man owning the vehicle will start for the shop with his bad tire to have it repaired or to give the man fits. After he gets to the shop, oftentimes he cannot find where his tire is open or that there is anything the matter with it. The tire will close up itself and be all right again. This is not always the case, however.

Some manufacturers in putting on rubber tires want to save money and have their tires cut too short for the size of their wheels. When this is the case the ends will come apart and stay so. And then there is only one way to fix this and that is to take the tire off and add a piece of tire to the original tire, which is done simply by taking a new pair of wires and putting on enough rubber to make the tire long enough so that there will be an inch compression

to the foot for the circumference of the wheel. This is conceded to be the rule that all manufacturers advocate for good results. I have had wheels sent me with old tires attached, requesting me to put back on the old tires when there would not be enough left of the old tire to make more than a quarter of a tire. The reason for such requests usually is that the other tires are nearly worn out and a new one would not look well with the others. I sometimes do this with such people. I always have a scrap box in which I put the pieces which I sometimes have to cut off of tires that are too long. I take a lot of these pieces and string them on to the wires and

when I have a long enough piece I put these on the wheel for about half price. As to the wearing qualities it is just as good as if it were in one piece. In this way I sell all my scraps at a good price. To repair a tire that has a piece cut out of it and the balance of the tire good, I take off and cut out all the bad places and take the pieces and string them on to the wires with enough new ones to make a good tire, put it on the wheel and as long as the wires hold the rubber will stay there. I use the machine put out by Morgan & Wright of Chicago, to pull my wires up and hold them while I braze them. Then I have a device made by the Hartford Rubber Works Company, of Hartford, Conn., to take out the compression and bring the

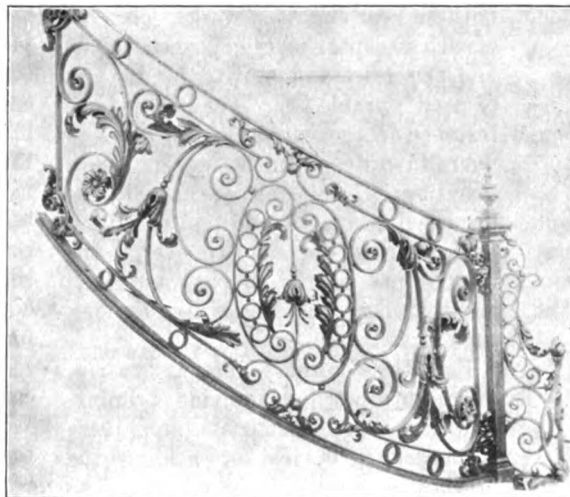


Fig. 2. PART OF A WROUGHT IRON BALUSTRADE OF PLEASING DESIGN.

you would hear their side of the case. But actual tests after a while proved some of the fellows' statements very untrue. And it caused many a tire to have to be replaced. I am not going to advocate any particular kind or make of tires in this article.

Now, as to the use of rubber tires. I have known some people to spoil a tire in a very short time, and I have known tires to be in constant use for five years and still be good and be of the same make. A rubber tire to wear well must be put on tight so that it cannot creep on the channel. If not tight enough, it will creep and chafe itself through on the bottom and in a short time be ruined. Then the manufacturer will be blamed, when it is the

rubber tire together. This last device is the best that I have been able to get hold of for the purpose and gives splendid satisfaction.

In mounting rubber tires, be sure and always use high carbon steel wire which will not stretch, for if you use soft wire, such as can be welded with electricity, you will find that in a short time you will have loose tires and your customer will have a kick coming. In brazing your wires, do not use the fine spelter such as is sent by the rubber tire people. Get what is called spelter wire and you will find that you can braze a wire in half the time that you can with the fine spelter. In brazing, I use the Turner brazing torch, Turner Brass Works, 63 No. Franklin St., Chicago, Ill., which is the only torch that will satisfactorily fuse brass. Some use gas brazers which are very nice if you are so located that you can use them. In conclusion I will say that when you put on rubber tires, be sure that you have good tires and put them on tight and even, and you will give satisfaction.

Talks to the Jobbing Shop Painter.—4.

Brush Keepers—Paint and Putty Keepers—Paint and Varnish Strainer, Etc., Etc.

M. C. HILLOCK.

No well regulated varnish room—and let us hope that all varnish rooms may very soon be so regulated—is without its varnish brush keeper of approved

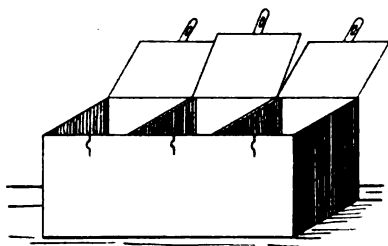


Fig. 1. A VERY CONVENIENT BRUSH KEEPER.

pattern. Of the making of brush keepers there is no end, but not a few fail of being surely practical. First of all, the keeper should be, when closed, perfectly air tight, and if it is such it will be dust proof. It should be light enough to handle easily, and sufficiently compact to store in small compass. It should, moreover, be strong and durable, and furnished with a lock to insure the safe keeping of the brush equipment. In Fig. 1 is shown a brush-keeper, possessing all the merits above enumerated, and quite large enough to nicely house three full sets of varnish brushes. As will be noted, this keeper is so arranged that any one of the three

compartments may be opened without disturbing the other two. This enables the workman to remove a set of brushes without exposing other sets to any disturbing elements. If desired, each compartment of the keeper may be wired to hold two sets of brushes and

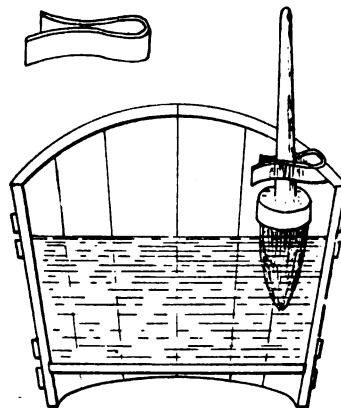


Fig. 2. THE PROPER WAY OF KEEPING BRUSHES IN WATER.

in the country shop the one keeper will suffice to hold all the varnish brushes, both for gear and body work. The cost of such a keeper should not exceed \$2.00 and this price will provide for the use of good, durable tin. The keeper once installed in the varnish room, write to your favorite varnish maker for a quantity of finishing varnish to be furnished minus the addition of dryers. Such a varnish does not skin over, to the later injury of the brush equipment; and if properly cared for will last a long time.

For the ordinary paint brushes, bristle brushes for applying priming, lead and rough stuff coats, etc., there is needed a device for holding the brushes in suspension in water. The practice of many painters of dropping the brushes into a pail containing a greater or less quantity of water and allowing them to rest upon the points, very soon puts a brush out of proper condition. It gets mis-shapen, loses its "hang," and elasticity, and presently becomes an expensive tool to handle. Fig. 2 shows a section of a paint brush keeper that needs only a cover to make it practically perfect for holding the class of brushes referred to. Bend a piece of spring steel to the shape illustrated, and then drive it into the staves of the pail as shown and you have a device that holds the brush securely and without injury to any part of its composition. These pails may be bought at confectionery or tobacco stores for five cents each. Change the water every other day at least, in order to insure pure, clean water

which latter will add length of days to the life of the brush.

Sometimes it becomes necessary to carry over for some days a quantity of mixed color, and, as nearly, if not quite all, colors used in the carriage paint shop are quick drying, they are apt to dry up, crust over and otherwise deteriorate. In Fig. 3 is shown a utensil by the use of which such a condition of things can be avoided. The sectional opening reveals the principle of the device. You provide a shallow pan into which a quantity of water is poured. Then into the water set the cup containing the color. Over this, place the boiler shaped cover which sets into the water forming a moist, air tight and dirt-proof compartment for the housing of the color. Thus conditioned, a mixed color will keep satisfactorily for weeks. In many large carriage paint shops this same device is used for keeping the putty supply. Float a bit of water over the mass of putty as it is placed in the large cup, then cover cup as here shown, and the putty will keep for months in perfect condition. In carriage painting, putty and color are perhaps two of the most important constituents entering into the paint and varnish fabric, and it is in the highest sense essential that they be handled and cared for in the most skillful manner possible. Especially is this true in the village paint shop that depends upon a strictly local patronage for its existence.

Another indispensable utensil in the carriage paint shop is shown in Fig. 4. Without a paint and varnish strainer, the shop is like unto the ocean liner bereft of chart and compass. The cut explains more clearly than a written

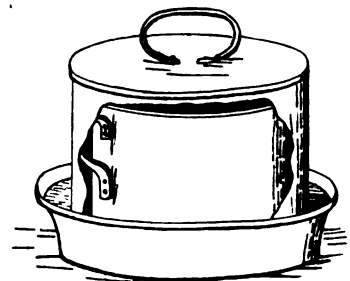


Fig. 3. A SATISFACTORY UTENSIL FOR PRESERVING COLORS IN THE MOIST STATE.

description the strainer and its accompanying fixtures. There is the funnel shaped strainer with its broad flange to fit over a cup or pail. Then the steel or iron ring to slip over the nose of the strainer after the piece of wire mesh or the cheese cloth has been drawn over. Next the cup with handle. The cost of

the device complete should not be more than \$1.00. Two of these strainers should be kept in every paint shop, one for paint and one for varnish. There is use for the paint strainer every working day, and use for the varnish strainer every time any varnishing is done.

However clean the varnish may look

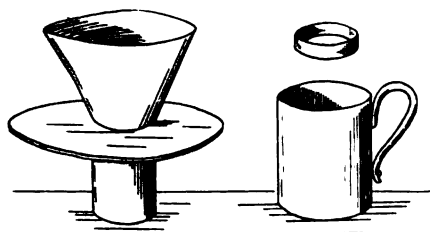


Fig. 4. A PAINT AND VARNISH STRAINING OUTFIT.

or be, it is a wise practice to strain it before using, and with this view the best carriage finishers the country over will be found to agree. The only provision for a sure thing in the varnish room is the perfection of details, and straining the varnish before using, is an important detail.

(To be continued.)

Forging Grips for Mine Cars.

STEVEN GATH.

The figure which accompanies this article shows the various steps in the process of forging grips, which are used in mines on cars for hauling coal from the mines. These grips are fastened on the draw-bars, and arranged so that by screwing up the cap, the cable is tightened and the car thus hauled up. This is an illustration of the work which we do here at the Monongahela Manufacturing Company, Monongahela, Pa. Our shop is a general jobbing one, doing all kinds of light and heavy work.

How to Advertise the Smith Shop.

BILLY BUNTZ.

In pleasing his customers the progressive smith uses tact by catering to their whims and treating impracticable hobbies with a little "molasses" or an unprejudiced opinion, so as to prevent ill-feeling. When a customer is obstinate, by way of illustration the smith may cite the case of one Black, who proposed that a job be done a certain way, which did not prove satisfactory upon trial, and Black himself afterwards so admitted; while a similar job done for Brown under a well-established method held together for five years.

Treating customers so that they do not become disgruntled or dissatisfied, is the first step in advertising. It may bring the smith all the work he can

handle with his present facilities, and by his customers speaking good words of him he will obtain still further trade. A great deal of advertising is done by the mouth—in so pleasing customers that they will talk about your business, somewhat unknowingly, but very effectively; while a curt reply may not only lose one job but forestall others as well. Even old customers dislike to be rebuked or laughed at. This method of advertising, that is, by satisfied customers, is inexpensive and hence should be practiced.

Where additional custom is sought it may be obtained through numerous channels. By the smith's having the interests of his town at heart rather than shutting himself up in his shop, profitable, as well as recreative results will follow. He may attend church, lodge or public meetings, while should he favor these institutions with donations it will probably be mentioned by the local paper and talked over by the folk. The talk advertises. Nothing shines so bright publicly as a dollar given in the proper spirit. Folk prefer to patronize a brother. A card in the church or lodge directory sometimes serves well.

In making a business of soliciting additional trade, it naturally means change in shop tools and methods. Machines should be added from time to time as needed or finances permit. They advertise also, as well as increase output and make the work easier. Hence, if Jones, the smith, has much grinding or hammering, he should install a gas engine to drive the emery, and buy a trip hammer at the earliest possible moment. He need have no fear that the expenditure will prove unprofitable. On the contrary, he will surprise himself and it will be a splendid advertisement.

Advertisements in the home paper bring good results, as they keep the smith always before the people. Such advertisements should be made interesting, however.

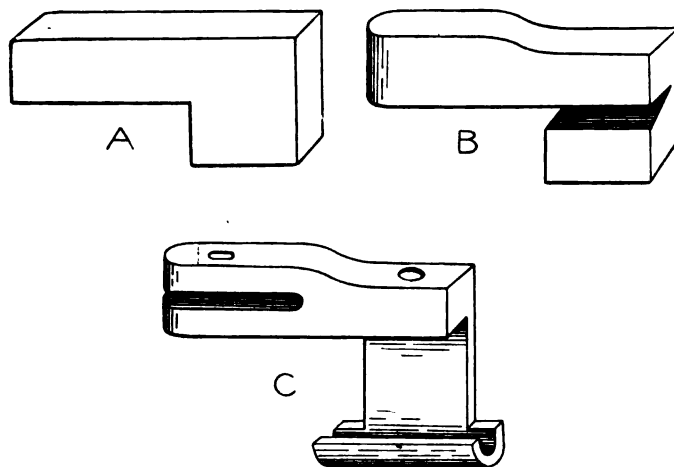
Of course, men will always be found who think advertising does not pay. Perhaps they have tried it by putting

in advertisements which were left to the editor to get up, rather than doing their own thinking. It depends altogether on how it is handled. If none of the first principles are observed, it is not likely they will overstock the smith with work. Advertising, like other things, has to be studied. This kind of advertising will be more fully described, and some useful hints given in next month's article, entitled, "Jones as an advertiser."

Fence signs are good advertisers and may profitably be placed miles away from home along the country roads. They should also contain a little reading rather than be a mere card. By having a stencil made, as many signs as desired may be printed. These signs may also be put on barns. If made in the shape of a bird house, they make good souvenirs.

Of course, the smith may go still further in advertising as his business prospers. There are many little ways of advertising which suit his locality and are timely or likely to bring trade. These are for him to think up.

Some smiths have stencils for wagon boxes, such as "Examine This. Built by Jones, Farmington." "Welded by Scott," or other wording may be stamped on iron work. "Shod Maud S," or well-known horses in his locality, may be used by a shoer, which avoids worn



METHOD OF FORGING GRIPS FOR MINE CARS.

expressions. Think up something original and use it in advertising what the people want.

Kinks and Conveniences in the Wagon-Shop.—4.

BY D. W. M.

Shop Conveniences.

It often happens that the body of a carriage must be lifted off the gear in order that certain repairs can be

successfully done. If it is a buggy body or wagon bed it can be readily lifted by hand. But if it is a rock-away, brougham or coach body to lift off by hand means the employment of a number of men and the use of bars to lift it, while others pull the gear out from under. I shall describe a much easier manner of handling such a body.

It will be necessary to put up either a long wooden roller, or two pulleys, (on either side of a space to be occupied by the vehicle), fast to the ceiling or joist and strong enough to hold the weight of the carriage body. Over these rollers or pulleys are passed ropes operated by a windlass in a convenient location. These ropes have iron hooks at the ends, which attach to rings in the ends of strong bars placed conveniently under the body. One man operates the whole thing. He can place the bars under the body and attach the ropes. He can draw up the ropes by the windlass until the body is held so that when the bolts are drawn, which hold the body and gear together, the gear can be carefully pulled out on its wheels and the body remain suspended, the windlass being held in position by a chuck and ratchet. He can then let the body down gently to the floor, or better still, to a truck. When repairs are made the body is placed in position, the ropes fastened to the bars as before, and the body lifted to the proper height. Then the gear is run under and bolted in place.

There is no bruising or straining of the body, one man has done the work neatly and quickly. A two-wheeled truck made like an ordinary trestle, but with an upright slide bar on one side to accommodate irregularly shaped bodies, is useful. That is, one of the top bars is made double, with a bar and two uprights to work between. Holes in the uprights are made for pins to hold it in position. One of the lower bars is made heavy and the ends rounded like an axle, on which are fitted two wooden wheels about 18 inches in diameter made of inch plank and nailed together with the grain crossing, so that each wheel is two inches thick. An ordinary linch pin holds them on. Make a square shoulder on the axle. Now use a pole resting on top of the trestle axle and under the bar on the other side of the trestle, the long end projecting towards you. You can then tilt the trestle with the body on it, and wheel it around with one hand, even if it be a coach body. Let the body almost balance over the

wheels so that the man who moves it will have but little weight to lift. Instead of the sliding uprights with the bar some prefer to use a box to prop the body, say on the front, as the uprights will sometimes break at the pin holes unless made very strong and of good timber.

Generally, as many trestles are in use as there are heavy bodies to handle at any one time. The trestles are cheaply made and it does not pay to lift the body off and on the trestle. Yet if this must be done, tip the trestle enough to allow one end of the body to touch the floor, then an assistant can hold the body while the trestle is drawn out. The body can then be lowered. Some kinds of work, such as wood work repairs, require removal. Place two planks on the trestle lengthways of the body on which it may rest. These will enable one to slide the trestle out and the planks are good levers to hold to in letting the body down to the floor, or they furnish a convenient method of sliding the body off the wheel trestle on to a woodworker's trestle if desired.

In the paint room the two-wheeled trestle is the most convenient method of handling a body and turning it easily to the light or moving it wherever wanted, and every paint room should have several extra ones, so that no carriage body need ever be removed from its trestle from the time it goes in to the time it goes out to be hung on its gear.

The paint department of a carriage shop is often divided into body and gear rooms. These again are subdivided into priming and rough stuff rooms, color and varnish rooms, finishing rooms and dark or dry rooms, for bodies; and for gears, into priming, sanding, color and varnish, striping, finishing and dry rooms. But in many shops, especially those where repairing is the principal part of the business, the gear and body room is all one, with a small room partitioned or curtained off for finishing coats. Since a curtain moves with every breath of wind and never fails to scatter more or less lint in the air, unless kept constantly wet, (which involves an endless waste of time and labor), a firm partition should be used, provided with a sliding door. The entire interior of a finishing room should be well painted, and the ceiling should be ceiled so that no dirt can sift down from above. Windows should not be open during or after applying a coat, but ventilation may be provided by wind wheels

inserted in place of a pane in each window. The large sliding door in the partition should have a small door in it to permit of passing out or in without shaking the partition. Every precaution must be taken to prevent draughts of air. It is not wise to dampen the floor of a finishing room just before or after applying a varnish coat. It is apt to cause trouble with the varnish. Keep the floor clean but not wet.

The use of inferior varnishes is often resorted to for repair work when it would not be used on new work. It is a common practice to use "one coat coach" varnish for even fine work as a finishing coat, because it is heavy and fills up some irregularities. Now there are cases as on a close bid or a job that would not permit a first class finish anyway, where a "one coat coach" is the proper thing. But people who want fine repairing done are usually willing to pay for it, and the only way to get the price is to do the work in truly first class style, using first class material. First class repair shops are in the minority and when once found out will secure a patronage that is not easily taken away, in spite of low bids.

A paint shop for carriage bodies should have a rubbing platform where water may be used plentifully and drain off without leaking through to the floor below. No body paint shop is complete without one. The gear room should have that portion where the sanding is done separated from the remainder so that the wind will not carry the dust to the color and varnish or striping work; and the gear finishing should be done in a separate room. The effect of dust on a finished gear is like a light sprinkling of sand thrown into the varnish. Paper screens made on light wooden frames should be prepared to lay over any panels exposed to any possible falling dirt or draught, of course made large enough to form a complete protection, and so placed as not to touch the varnish.

The place for keeping paints and varnishes should be convenient and yet dark and cool. Varnishes may even be kept in a damp place, also keg lead; but dry white lead or any dry ground paints should all be under lock and key accessible only to the foreman painter.

The equipment of the trimming shop is comparatively simple and should embrace the necessary work bench and cutting table, closets for goods which may be locked, sewing machine, stitching horse, etc., not omitting a small heater for the paste pot, unless the

paste is bought ready made. Like the paint shop, this room should be large enough and so arranged as to take in a complete carriage on wheels, whenever desirable.

(To be continued.)

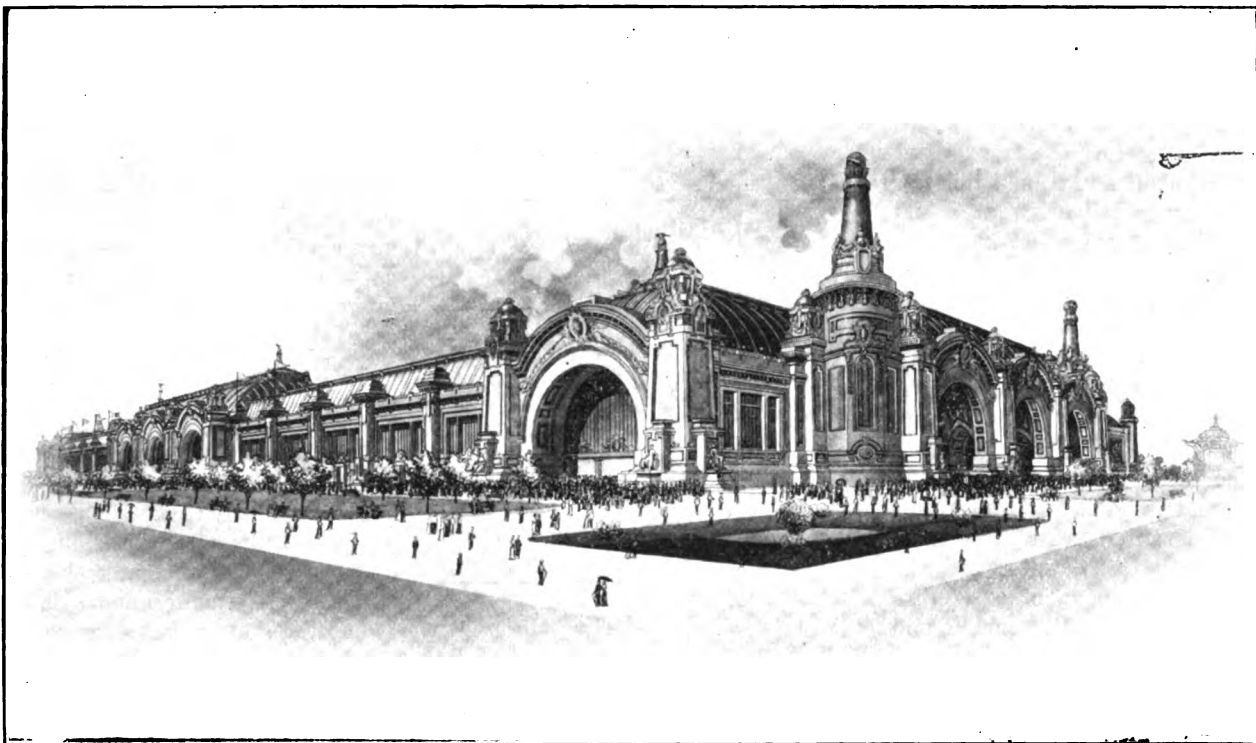
Transportation Building at the World's Fair.

The Transportation Building, the great structure which will stand in the northwest corner of Forest Park and is of special interest to readers of THE AMERICAN BLACKSMITH, owing to the fact that it will contain the immense proposed exhibit of vehicles of all descriptions, will be 525 by 1,300 feet. The general plan of the building is

continent. These two essential elements are apparent throughout the structure. On the east and west fronts are three magnificent arches which embrace more than half of the entire façade. Each of the arched openings will be 64 feet wide and 52 feet high. Through the archways fourteen permanent railroad tracks will be laid from one end of the building to the other. At the sides of the three openings the projecting angles are accentuated by tower or pylon effects which reach to a height of 150 feet to the base of the crowning statue. The pylons are not so much accentuated as to be obtrusive or out of harmony with the structure.

happy. Over each of the big archways is a lofty curve which supplies a background for the architectural features.

The statuary is placed in front and at the base of the main piers at the sides of the grand openings. This affords sixteen groups which will illustrate Transportation in all its phases as well as the progress made by the United States in this science. There will also be four groups of statuary surrounding the four pylons placed at the east and west fronts. The architect has subdued the use of sculpture in the building. He depends on mass effects and the grouping of masses. That is, he depends on architecture rather than on tawdry decorations for his effect. The man-



EXTERIOR VIEW OF THE TRANSPORTATION BUILDING AT THE WORLD'S FAIR, ST. LOUIS.

rectangular. There will be no court. The great distinguishing feature is the massing of the three entrance ways so that they will form an arcade, and this feature will be repeated along four sides of the structure. The three arched entrance ways will take up almost the entire 525 feet of the façade on the east and west sides. On the north and south sides these arcade entrance ways are placed in the center.

The Transportation Building covers over 15 acres. The façades show a most pleasing adaptation of the French Renaissance. The building combines a feeling of the magnificent Exposition building and of the high-class railroad depot which prevails on the European

continent. On the north and south fronts the architect has deemed it well to repeat the three massive archways which form the center feature of smaller fronts. This treatment pleasantly breaks the unwieldy façade of 1,300 feet. On the north and south fronts the pylon feature is omitted, but massive piers are repeated at intervals and lend dignity to the design. Flanking the three openings on the long fronts are great rows of magnificent windows as wide as the archways. Not only will visitors be admitted through the twelve huge portals, but subsidiary entrances are supplied at frequent intervals in the remaining stretch of walls. The roof treatment of the building is peculiarly

agement of the plan is simple and direct. The entire width of the building is spanned by five well-designed uniform trusses. Special endeavor has been made to afford plenty of illumination by day without the use of skylights. Light is introduced through the monitor windows over each span of the five trusses.

The building will contain about four miles of standard gauge railroad track. Even with this immense trackage two entire bents of the building are left free of rails and afford an exhibit space of 270,000 square feet. At the east end a gallery 20 feet in width extends across the building. This affords an excellent place from which to view the picture below.

In order to secure space it will be necessary for those wishing to exhibit to make early application, for a very large number of applications have already been made, especially by foreign countries. No charge will be made for space, the only expense being the installation and care of exhibits.

The Elementary Principles of Mechanical Drawing.—3.

Common Problems. Problems Relating to Lines and Perpendiculars.

It is very often convenient to locate a certain point on a drawing without actually measuring distances. For example, to find the middle point of a straight line or arc of a circle. To do this, as in the case of the straight or curved line XY (Fig. 1, A), take any radius, and placing the compass point upon X, draw two arcs of a circle, one at either side of the line. Next, take Y as a center, and with the same radius, draw arcs intersecting the first arcs at R and S. Join R and S, and this line bisects the straight line XY at P and the arc XY at Q. Any arc may thus be bisected.

To draw a line perpendicular to another line from a certain fixed point in it is a very simple problem. In Fig. 1, B, a line is to be drawn from P at right angles to the given line MN. Take any radius and with centre P mark off equal distances from P, giving S and Q. Then with S as center and any radius (greater than S P) describe an arc of a circle. Similarly, with Q as center and the same radius describe another arc intersecting the first at R. Join R and P and this line will be perpendicular to MN.

Sometimes a line must be drawn at right angles to a given line from a point outside it. At C, Fig. 1, this process is illustrated. YZ is the line and P the point. With P as center and any radius (greater than the distance from P to YZ) describe an arc YZ. With center Y and same radius describe arcs on both sides of YZ. With center Z and the same radius describe an arc intersecting the first at L. Join PL, and this line will be perpendicular to YZ and pass through the point P.

When the perpendicular is to be drawn from the center point of the given line, as at 1, E, with center M and with any radius greater than MP, describe an arc at O. With center N and the same radius describe a second arc intersecting the first at O. Join OP.

No matter at what angle to the horizontal a line may be inclined, other

lines may always be drawn parallel to it, and at any required distance from it, by the following method: To draw a line parallel to the line X and at a distance from it equal to Y (See Fig. 1, D) take any two points, R and S, on X as centers and a radius equal to Y, and describe arcs T and U. Then draw a line tangent to these two arcs, (just touching but not cutting them) and it will be parallel to X at the distance Y.

Constructing the Ordinary Three and Four-Sided Figures.

An equilateral triangle may be described upon a given base by the method shown at A, Fig. 2. To draw such a triangle upon XY, as base, take X as center and XY as radius and describe an arc. Next with Y as center and XY as radius describe a second arc cutting the first in P. Join XP and YP.

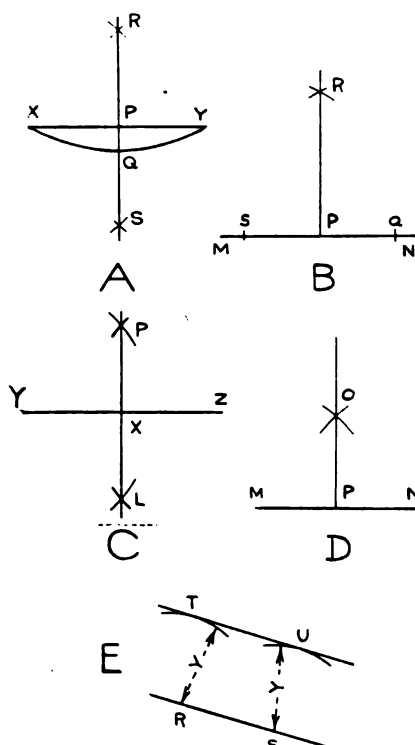


FIG. 1. PROBLEMS RELATING TO PERPENDICULARS AND PARALLELS.

A perfect square whose side is YZ (See Fig. 2, B) may be obtained by erecting a perpendicular from Y. Then with center Y and radius YZ describe an arc to cut the perpendicular at M. Then with M as center and the same radius describe an arc at N, and with center Z and radius still the same describe an arc to cut the former at N. Join M, N and Z and the resulting figure is a square.

At C, Fig. 2, is shown the mode of constructing a rectangle whose sides shall be equal to two given lines. Here XZ is one line and Y the other. At X

erect a perpendicular to XZ. Cut off XQ equal to Y. With center Q and radius XZ describe an arc at P, and with center Z and radius Y describe an arc intersecting the first arc at P. Join Q, P and Z and the rectangle is obtained.

A circle, O, is given, and it is necessary to describe a square about it. This is done at D, Fig. 2. Draw two diameters LM and NQ to the circle, at right angles to each other, intersecting at center P. With center L and radius LP describe an arc at R and another at S. With center M and the same radius describe arcs at T and X. With center N describe similar arcs at R and S intersecting those first drawn at these points. Next, with center Q and radius still the same, describe arcs at S and T intersecting those already drawn at these points. Join R, S, T and X and the square is complete.

Three lines are given, as XY, PQ and RS. To place these three in the form of a triangle, take X as center (See E, Fig. 2), and PQ as radius and describe an arc at M. Take Y as center and RS as radius and describe an arc at M intersecting the first at M. Join XM and YM.

Problems Involving Division of Lines and Angles.

Any angle may be bisected by the method shown at A, Fig. 3, where the angle QPR is to be bisected. With center P and any radius PR describe an arc cutting the arms of the angle at R and Q. Next, with center Q and any radius describe an arc, and with center R and the same radius describe an arc cutting the first at S. Join SP, and this line bisects the angle P.

At B, Fig. 3, is shown the method of drawing an angle equal to a given angle. Here TQV is the given angle. With center Q and any radius, as QV, draw an arc intersecting the arms of the angle at T and V. Take a line, as LM and with center L and radius QV describe an arc. With center M and radius TV describe an arc intersecting the former at N. Join LN and the angle at L is equal to the one at Q.

Since the circumference of any circle is considered to be divided into 360 degrees, it is an easy matter to obtain an angle of any magnitude simply by dividing a circumference into the required number of parts. Take the circle O. Draw two diameters at right angles to each other, QR and ST, intersecting at the center P. Then SPR is a right angle. To obtain an angle of 45 degrees, divide this angle into two

equal parts, as SPZ or ZPR. An angle of $22\frac{1}{2}$ degrees may be had by dividing 45 degrees into halves as ZPV or VPR,

required to draw one in a circle, or to inscribe it in a circle, as it is termed. X is the circle (See Fig. 4, A). Draw

angle), PXY and PYX. Take P, the point where the lines intersect, as center and describe a circle with radius PX. Produce XP and YP to meet the circumference in Q and R. With center X and radius XY describe an arc to cut the circumference in S, and with center Y and the same radius describe an arc to cut the circumference in W. With center Q and radius XY describe an arc cutting the circumference in T. Lastly, with center R and radius XY describe an arc at V. Join X, S, T, Q, R, V, W and Y.

Great accuracy must be employed in performing any of the operations of geometry described above, for the width of a pencil-line out of the true, will sometimes throw a whole construction wrong. Special care must be taken in obtaining the correct angle, for an error of a

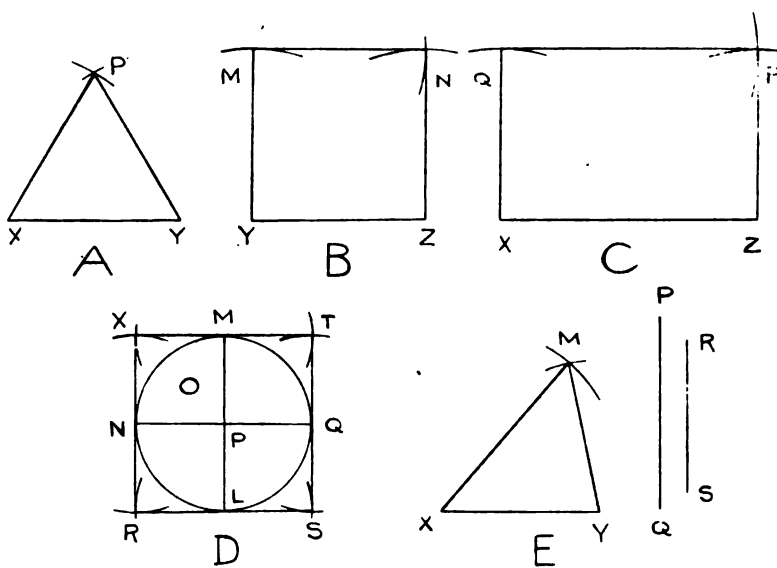


Fig. 2. CONSTRUCTION OF RECTILINEAR FIGURES.

and one of 15 degrees by dividing 45 into three equal portions as SPW, WPX, and XPZ. This must be done by spacing, since no true method has been found for trisecting an angle. Similarly, an angle of any magnitude may be obtained. The angle SPX is thus one of 60 degrees, and WPR one of 75 degrees.

Fig. 3, D shows a good method of dividing any line into any number of equal parts. XY is the line here, and

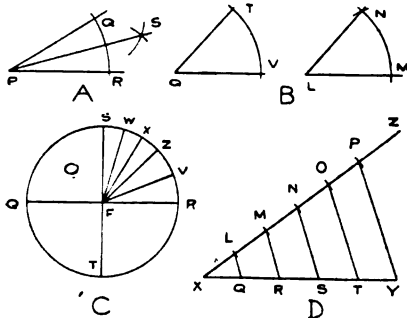


Fig. 3. A FEW PROBLEMS ON ANGLES AND LINES.

it is to be divided into five equal portions. Draw a line from X, any length XZ, and with the compasses or dividers step off five equal divisions of any convenient size XL, LM, ML, NO and OP all equal to XL. Then XP is divided into five equal parts. Now join PY and draw through L, M, N, O, lines parallel to PY, cutting XY in Q, R, S, T, and these points Q, R, S and T will divide XY into five equal portions.

Constructing the Hexagon and the Octagon.

The hexagon is of frequent occurrence in blacksmith drawings and is very easily constructed. Suppose it is

a diameter of the circle, NO, in any position required. Then with center N and radius equal to the radius of the circle, describe arcs at P and S, intersecting the circumference at these points. Next with centre O and the same radius, describe arcs at Q and R. Join N, S, R, O, Q and P. It may be noted that the sides of the regular hexagon are all equal to the radius of the circle described about it.

Sometimes a regular hexagon must be made, having its sides equal to a given line. This is done at B, Fig. 4, where YZ is the line. With center Y and radius YZ describe an arc at P. With center Z and radius YZ describe a second arc at P. Next, with center P and same radius YZ describe a circle, which will pass through Y and Z. Keeping the same radius mark off the circumference at L from Y, thence from L at M and so on, dividing the circumference into six equal portions, at L, M, N and O. Join Y, L, M, N, O and Z.

The octagon is the only remaining figure of common occurrence. To inscribe a regular octagon in a square (as at A, Fig. 5) draw the diagonals KL and MN intersecting at P. With center K and radius KP describe arcs cutting the sides of the square at Q and R. With center L and radius LP draw arcs S and T, and with center M and radius MP describe arcs at V and W. With center N and radius NP describe arcs intersecting the sides of the square in X and Y. Join VX, QS, YW and TR.

To erect a regular octagon on XY as base: At X and Y make angles $67\frac{1}{2}$ degrees (i. e. three-fourths of a right

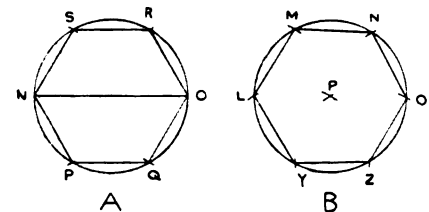


Fig. 4. HOW TO MAKE HEXAGONS.

fraction of a degree at the center of a circle will make a large error at the circumference of a large circle. Of course accuracy can only be cultivated by practice.

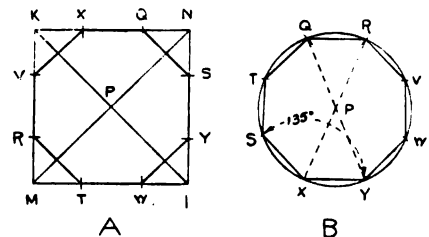


Fig. 5. MODES OF CONSTRUCTING THE OCTAGON.

In constructing any of these figures, the construction lines should be sketched in very lightly so that they may be easily erased when the problem is finished.

The Horse vs. The Auto.

Visiting any of the parks just now and noticing the processions of vehicles that throng the drives, one is led to compare the different styles. The most marked distinction lies between the horse-carriage and the horseless. There is something lacking in spirit in the latter. No amount of style nor finish can make up for the absence of a span of lively, well-groomed horses. It is doubtful whether the automobile will ever supplant the horse with the wealthy pleasure-seeker of taste.

Pullin' Down The Shop.*

EDNA MANNERS.

When eighty years has passed an' gone,
 An' brought their cares an' joy,
 A feller may be smart an' strong
 But yet he ain't no boy.
 So, as I look acrost the street
 The tears they will not stop—
 It's mighty hard to set an' see
 Them pullin' down the shop.

An' Joe an' Billy look askance
 At Gran'pa when he cries.
 It makes me feel ashamed to see
 The wonder in their eyes.
 They say "It's jest the greatest fun
 To see the old walls drop,"
 An' play they're men a-helpin' hard
 With pullin' down the shop.

It seems a-most jest yesterday
 Since I such frolics planned,
 An' since I shot up tall an' strong
 An' toiled with brain an' hand.
 O, proud the day I learned my trade,
 An' struggled to the top,
 An' set a-buildin' yonder, where
 They're pulling down the shop!

The city slowly come our way
 An' land was sellin' high,
 An' still I worked in yonder shop
 And dreamed of days gone by.
 The home ones—some are dead,
 And some in distant lands now stop—
 So where's the good of mournin', though
 They're pullin' down the shop?

Each brick an' timber holds a spell
 To touch the old man's heart.
 The hopes an' fears of sixty years
 All yonder bore their part.
 I've played my game—a good one too—
 It's time old Jim should stop,
 An' yet—the tears will come, because
 They're pullin' down the shop.

*Written expressly, for the July issue of the
 AMERICAN BLACKSMITH.



Midsummer greetings to the smith!

A first-class horseshoer is an artist
 in his own line.

Uphill, or down, a concern must go.
 Nothing in this world can stand still.

How about the harvesting repair work of
 your locality,—is that competitor getting it
 all?

Comstock-Haigh-Walker Co., Canan-
 daigua, N. Y., are in the market for a
 couple of new fires.

Have you a library? A few well-
 selected trade text-books should form a
 part of the stock of every blacksmith.

Every craft will be represented at the
 World's Fair at St. Louis next year. Will
 the smiths present a proportionately good
 showing with the others?

An attractive sign to a blacksmith
 shop is a great trade winner. Try to
 think of something new and catchy in this
 line. It will pay.

The working classes are indeed coming
 to the front now-a-days. In Boston and
 some other large cities, a "working horses'
 parade" is one of the latest institutions.

Are you one of those who grumble be-
 cause prices on materials are high, or one
 of those who are determined to make prices
 on work high? Don't grumble. There
 are too many grumblers in the world al-
 ready.

A curious little horse has been brought
 to Tampico, Mexico. He is 22½ inches
 high, weighs 73 pounds and is seven years
 old. He was stolen from an island off the
 coast of South America, where the natives
 worship little horses of this kind.

An engine is like a horse. It will last
 longer and do better work if not worked
 to the full extent of its power. The engine,
 however, has the advantage of consuming
 only enough food to produce the power
 required, and so is more economical.

Old fashioned tools may be interesting
 to the hunter of curios, but just step into
 my shop one of these July days and work
 my old bellows during your noon hour,
 with the forge in full blast, and you won't
 want to hunt curios any more.

A sensible horse, says a contemporary,
 will never hurt a man, if used right, but a
 horse without sense cannot be trusted.
 If a horse is vicious from lack of sense, it can
 certainly do no good to treat him cruelly if
 he has not brains enough to understand.

At different seasons people want differ-
 ent things. Think just what your custom-
 ers need done at present, and let them
 know that you are waiting to give them the
 best work in that line. You can even
 make them want things by a little careful
 advertising. Ever tried it?

Mechanical power is taking the place of
 living force in every possible line. One of
 the newest things is a trackless traction
 train for drawing timber in lumber dis-
 tricts where it is not convenient to install a
 railway. The mill-owners find these trains
 more economical than horses.

Keep right on. Results may be slow,
 but time will tell. Set about organizing
 your business and installing method, and
 you will one day discover that you have
 attained a degree of perfection that will
 surprise yourself. The result will be ap-
 parent in the class and attitude of your
 customers as well as in your profits.

Do not say to your customer that his
 job cannot be done, without first carefully
 thinking whether you cannot work out a
 way to do it. He may take it to a smith
 who will think the matter out, do the work
 and boast that "So-and-so said it could
 not be done." Make a desperate effort to
 accomplish it even if it is the smallest
 piece of repairing.

An interesting branch of the sheer's
 work in Texas consists in shoeing oxen
 for mountain travel. The ox to be shod is
 thrown down by means of ropes, and sep-
 arate plates are fastened to the portions of

his cloven hoof. The operation involves
 considerable excitement and danger to the
 shoers, and the poor animal is often sick
 for days afterwards.

A really good thing is always good.
 You may have a tool or method that is an
 old stand-by, handed down from your
 grandfather, and yet another smith may
 never have heard of it. Describe it to him
 and he may be able to suggest improve-
 ments that will make it of value to the
 whole craft, and thus you will benefit each
 other. Think about it.

A complete system of book-keeping in a
 blacksmith shop should show just how
 much material of every kind is on hand,
 and when received, so that the old may be
 used first. Such a set of books may be
 kept extremely simple and convenient in
 detail. Any man may gradually work out
 a system to fit his own needs and ideas.
 The degree of perfection to which he may
 bring them depends upon himself.

Slurring over the unnoticeable parts of
 work is a fault of the present-day American.
 Manufactures presenting a good appear-
 ance to the casual observer will not stand
 the test of close scrutiny. It is just this
 that has spoiled the foreign market for
 American products. Likewise, is the slip-
 shod worker found out and shunned by
 the paying kind of customers. A reaction
 has set in, and even Americans want good
 value rather than cheap trash.

A new material has been produced by
 the American inventor of carborundum,
 Mr. E. G. Acheson, of Niagara Falls. The
 new substance is called Siloxicon and is a
 product of the electrical furnace. It is
 formed from ground coke and sand, after
 the manner of carborundum but does not
 require so high a temperature. It is of a
 gray green color. Siloxicon will stand very
 high temperatures and is very useful for fur-
 nace linings, fire-bricks, etc., in the case
 of furnaces where oil is used as fuel.

Ever tried to make an artistic piece of
 wrought iron after your own original ideas?
 This is an excellent way to put in odd min-
 utes. It affords play to the smith's artis-
 tic tastes as well as practice in detail work,
 besides forming an interesting change
 from the ordinary routine work. This
 line with a little practice may be made a
 profitable one as well, for ornamental
 wrought iron is constantly growing in
 favor. It isn't everyone who can put his
 ideas into iron, however.

It was raining when we passed Tom
 Tardy's shop one evening last week, and
 we stepped in to get out of the wet.

Tom was very busy and somewhat ex-
 cited, and upon looking around, it was easy
 to see the cause. In about a dozen places
 the rain was coming through the roof and
 already several of the tools lay in little
 puddles.

"It keeps breakin' out in fresh places.
 that's the trouble," said he, as he shifted
 things to escape the latest drip.

"Wouldn't it pay you to have a new roof
 put on?" we asked him.

"Well, you see it's jest after a dry spell
 that it acts like this—I dunno, though,—
 but it'd cost a heap o' money.

And he began to think seriously about it.

American Association of Blacksmiths and Horseshoers.

What thought have you, reader, put on the subject of craft organization and co-operation, and what has been your conclusion? Have you been contented to watch the prices of stock and living necessities go up on the one hand, without the power, as you thought, to ask correspondingly higher prices for your work on the other? If you are a shop-owning or a shop-running smith, the situation needs no describing.

Strange as it may seem, to persons working for stated salaries, prosperous times bring hardships, because the purchasing power of their money is diminished. Hard times are good times for them. It is very evident that blacksmiths who fear to raise their prices on account of competition place themselves in very much the same position as those who work for a fixed salary, and hence good times are anything but good for them.

There are some mechanics running shops who realize the foolishness of working at old scales of prices, and who in the face of competition pluckily advance their prices to a figure which will give them a proper profit, and we figuratively shake hands with everyone who has done this.

We should like to see prices raised in every smith shop in the land. We should like to know that every blacksmith was making as good a living as his skill and strength deserve. The object of the American Association of Blacksmiths and Horseshoers is to better the condition of the craft in every possible manner, and to point out ways for improving its welfare. It is a mistake to think, because there is competition from neighboring shops, that better prices cannot be obtained. Other crafts and professions long ago found that rate wars and price cutting were disastrous to all who participated and profitable only to customers and patrons. The sooner the blacksmith, the horseshoer and the wheelwright realize this fact, and see the advantage of the craft working together as a whole, the sooner will they be able to better themselves. Co-operation is the great need to-day.

If you have been asleep or your locality has been asleep, thinking that circumstances prevented a betterment of condition as far as prices for your work are concerned, wake up at once. Wake up, throw aside the jealousy or prejudice which may be standing in your way, and commence to agitate the question of better prices. We should like to see every county in the land organized and co-operating, and should be glad to lend all the assistance possible to any who would like to see an organization of this kind in their county. Whether such associations are formed as branches of the American Association of Blacksmiths and Horseshoers or not, we should like to see them formed everywhere for the benefit of the craft. The American Association is doing a good work in various counties of New York State, and will gladly assist in forming associations everywhere.

One or two enthusiastic smiths can

county. There is no telling what a little effort on your part will accomplish.

Remember also that every effort made by you is setting an example for your less energetic neighbor. In this way your influence will be doubled. There is nothing so helpful in such a case as earnestness and enthusiasm. Nobody can help being affected by these qualities in another. You may as well be a leader.

A New Form of Tongue Support.

A novel wagon tongue support is shown by the engraving on this page, and some of its features may be of interest to readers of THE AMERICAN BLACKSMITH. This support is attached to the front axle instead of to the tongue and its long arm gives it great leverage or supporting power. Adjustment may be made simply by turning up the bolts that pass through the eyes of the spring ends, and in this way the

support may be adjusted for different weights of tongues. The construction of the support makes it very flexible, so much so that when the tongue is held by the support it moves freely up and down with the motion of the team, and again the weight of the neck yoke when no team is at-

tached will cause the end of the tongue to rest on the ground. This support is the invention of H. C. Burk, Burlingame, Kansas.



A NOVEL DEVICE IN THE WAY OF A WAGON TONGUE SUPPORT.

accomplish wonders, and we are glad to give the benefit of our experience to any who wish it. Some counties are ripe for organizing at once, in others some effort may be needed to educate the men up to the proper point.

It is usually the case that we must labor for anything well worth having in this world. Surely the many advantages of a strong association are worth considerable time and effort.

Wake up, and wake your brother smiths. Get together, co-operate, work with instead of against each other. If you can succeed in forming a little independent association in your town or county, do so by all means. If you desire our help and wish to become members in the American Association we should be glad to have you communicate with us. But by all means talk up the matter with your nearest neighbors and brother smiths in the town and

Hints on Bicycle Repairs.

BY APPLETON.

Although many misfit jobs in the original construction of a bicycle are scornfully described as blacksmithery, yet no country bicycle tourist will hesitate to ask the aid of the village smithy when no repair shop is at hand and a break down occurs. If the smith is at all practical in his efforts he may turn many an honest dollar and make himself the undying friend of the cyclist.

When first bicycles were made the frame and forks were brazed in an ordinary open fire forge, although a gas blast is now used. With a small stock of bicycle tube of different sizes, a supply of soft brass wire and the borax which

every smith has, no difficulty will be found in replacing broken tubes or fork stems or rebrazing loosened joints.

If the roads in the vicinity of the smith shop are hilly, broken cranks and chains may bring frequent customers. The cranks may be welded if not broken too near the pedal end, in which case a new piece must be welded on and drilled and tapped for the pedal pin. A set of bicycle taps and dies are sometimes a useful addition to the stock of tools. With a few extra links of chain it is a simple matter to replace broken ones with the aid of a few blows from the hammer.

A Price Schedule from Missouri.

W. M. STRAIT.

Wagon tongues.....	\$2.00
Hounds, each .....	.50
Front and hind bolsters, each.....	1.25
Front and hind axles	2.25
Coupling pole	1.15
Setting tire, 1½, each .....	.40
Buggy and surrey tongues, each.....	2.00 to 2.50
Welding stubs, according to size, each .....	.50 to .75
Setting boxes, each.....	.25
“ axles	1.00
“ tires, per set.....	2.00
Horseshoeing, per team.....	2.40
Resetting “ “	1.60
Wagon spokes up to 1½ inches, set, each.....	.15
Buggy spokes, each.....	.15
Single spokes, each.....	.20

Steel and How to Treat It—2. The Heating of Steel.

JOSEPH V. WOODWORTH.

Improper heating of steel in many shops, as well as a deal of unnecessary expense in forging, annealing, hardening and tempering steel, may be directly traced to inexperience; but more often to the crude and obsolete means employed for the heating. Hence, proper facilities should be provided for heating in all shops where expensive tools, forgings or tempered parts are made.

In heating for forging, a clean fire and plenty of fuel, so that jets of hot air will not strike the corners of the piece, are the first requisites. Care should be taken to keep the fire regular so that a good uniform heat will be given to the whole part to be forged.

A great many think that it is a too high heat that is responsible for trouble in forging, while on the contrary, it is usually uneven heat. Suppose we put a bar of fine steel into a very hot fire and bring it as quickly as possible to a

high, yellow heat, or until it almost scintillates, the outside of the bar will be very soft and in an ideal condition for forging, while the center portions will probably not be even red hot. Thus the metal has separated into two distinct sections; the soft outside and the hard inside. We will now proceed to forge this end of the bar and the result will be that the soft outside will yield to the hammer quicker than the hard inside, thus tearing the outside particles away and leaving the inside sound. The forged piece will be useless unless turned down to the hard core. If on the other hand the bar be heated and then the outside cooled so as to get the inside much hotter than the outside and the piece forged, the result will be that the outside to all appearance will be sound until it is machined and then it will be found to be “piped” or hollow inside, and will be useless. In order to forge a piece perfectly sound and good, it is necessary that the steel be heated *evenly* red hot *all through*.

A high heat is never desirable except when mechanical means are at hand for heavily forging the bars, as this refines them. Thus where fine steel is heated until very soft, the grain raises and becomes coarse, and unless a very heavy steam hammer is at hand, it cannot be refined. The moral of this is never to heat a piece of fine steel, which has to be hand forged, higher than a bright red heat.

Again, large quantities of steel are ruined by being left in the fire after they are properly heated. When you get your steel to the proper red heat, don't let it “soak” for awhile, but remove it from the fire and harden or forge it as rapidly as possible. Allowing steel to soak in the fire after it has reached the proper heat renders it brittle and does great injury to it. If these precautions are taken, steel may be always heated safely up to even a bright yellow red, and at this heat it will weld easily.

Not only when heating for forging but in the other processes as well, always bear in mind that a uniform heat is necessary to insure success, and that every variation of heat which is great enough to be seen, will cause variation in the grain which will often result in ruining the steel. Thus the two things to be avoided in heating steel are *too high heat* and *irregular heat*. Too high heat raises the grain and makes the steel coarse, while irregular heat causes irregular grain, irregular strains and cracks.

In regard to the heating arrangements, while an ordinary forge is all that is necessary for the forging, annealing and tempering of rough tools it will not do for fine ones. When it is considered that an accurate cutting tool which has been annealed properly before finishing, and then carefully and accurately hardened and tempered afterward, will accomplish many times the amount of work that an imperfectly treated one will, the expense of providing suitable heating facilities is insignificant, especially when the longevity of the tools treated by them is considered. In shops where a fair number of fine cutting tools are made and used, the cost of proper heating arrangements will be made up in a short time by the money saved through the use of the properly hardened and tempered tools. Another thing; after having installed a suitable steel heating plant, hire a mechanic who understands the treatment of steel to run it. With this combination, and a supply of good, high-grade steel, there will be no dissatisfaction with the working qualities of the cutting tools. If there is, there will be no excuse for it; carelessness will be to blame.

Although in a great many shops very little importance is attached to properly placing the furnace, it will be found that if the location is in a darkened corner where the sun's rays will not come near it, the best results will be attained. No matter what kind of treatment is to be given steel, the heating arrangements should never be located where there is too strong a light. If the light is uniform, it will not be difficult to attain uniform results; while, on the contrary, if the light is too bright, there is a chance of heating the steel too hot and when it becomes darker not hot enough.

There is considerable difference between steel which is hard and steel which is both *hard* and *tough*. When a tool has been hardened and tempered and the edge crumbles away, the steel is hard but not tough, and was heated wrongly; either when forging, annealing, hardening or tempering, or was not quenched right. On the contrary, when a tool has been heated properly and hardened and tempered as it should be, it can be very hard and the edge will hold; because for a given degree of hardness the same degree of toughness has been imparted during the heating and hardening processes. So always bear in mind that successful steel treatment starts from the minute the steel

enters the fire, and that unless the heat is applied right, failure will surely

I once had a number of sockets to make for valve stems about the same

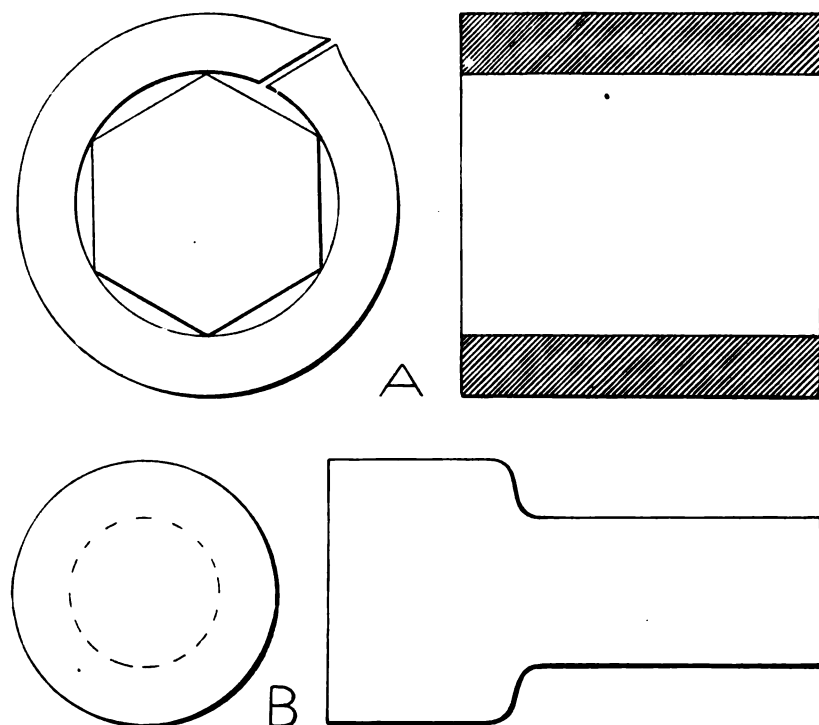


Fig. 1. CONVENIENT METHOD OF MAKING LARGE WRENCHES.

result, no matter how carefully the subsequent operations are carried out.
(To be continued.)

Convenient Methods of Making Wrenches.

R. H. HOOVER.

The accompanying sketches show designs for two different socket wrenches, which I think will be of interest to anyone who may have wrenches to make—especially if he is making them piece-work or if he is anxious to make the business pay, and I believe we all are.

To make a wrench of 1 inch up to 5 or 6 inches, first make a band as large as the largest diameter of the nut or a little larger so as to admit the mandrel easily. Fig. 1, A, shows an end view and a section of this band not welded. Next make the shank as in Fig. 1, B, large enough to fill up the collar very tight, so it will not be inclined to work off in heating. Now instead of welding the band and shaping the nut afterward get the stem or shank very hot, slip the collar on and take a good heat on the whole thing. When brought out to weld, let your helper slip the mandrel in place and if you have a steam hammer, put in a spring swage just the size you want the outside of your collar to be, and weld with the mandrel in place. This will allow you to make two wrenches where you would one in the ordinary way.

as socket wrenches. They had long stems on them about $1\frac{1}{2}$ inches in diameter to reach from the top to the bottom of a floating dry dock which was built here for the U. S. Government, and I made them solid in the wrench part. The wrench was $3\frac{1}{2}$ inches outside diameter and $2\frac{1}{4}$ inches inside. The handle was $1\frac{1}{2}$ inches in diameter.

Still another way of making socket wrenches is shown in Fig. 2. The stock used in this tool fills up the hole in the die, A, tight down to the shoulder, as seen in the sketch. By forcing the punch, B, into this stock we force enough down in the 2-inch part to draw out the shank in order to piece out the handle. Thus we make a nice socket in one pass.

Next to the hammer, the wrench is the most common and most useful tool of the mechanic. It is, therefore, very convenient to be able to make different kinds, suitable for different work, at the least possible expense of time and materials. The above methods will be found to fill both these requirements.

More Luck in Blacksmithing.

THOS. BEASLEY.

In a former article entitled "Luck in Blacksmithing" was described an instance in which a difficult piece of work was done simply by employing a little originality in making the means at hand suit the end in view. To my mind it is

not the tools a man has to do a job with so much as the brains he possesses that help him in an emergency. By this means, things apparently impossible may often be accomplished, and the ordinary person will call it "luck."

I will illustrate to you now a job I did once that seems just as reasonable. I had a sand pump (used in drilling oil and gas wells) to mend. This one was made of 6-inch wrought pipe with $\frac{3}{8}$ -inch by 3-inch band and bail, attached. The bail was parted or broken loose from the band, and had to be welded back to the band without disturbing the threads on the inside of the band or getting it out of round, otherwise it could not be screwed on the pipe again. Like several other smiths, I pronounced the job impossible to do, but the oil well driller would not take "no" for an answer and begged me to try it, as he had heavy expenses and could do nothing without this implement. So telling him I would not guarantee the work I studied the job thoroughly and succeeded beyond my most sanguine expectations, in welding it so thoroughly that the $1\frac{1}{2}$ -inch bail broke, and the band weld stood the strain.

You may say this was luck, and per-

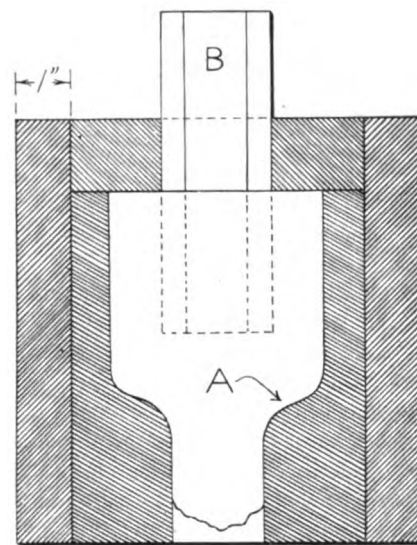


Fig. 2. A SMALL SOCKET WRENCH MADE FROM SOLID STOCK.

haps that had something to do with it, but at the same time you will admit that I must have made a lucky heat, had a lucky forge, used a lucky helper and a charmed hammer. Careful attention to detail is the main element in the so-called "luck," and those who practice this usually draw at least one-third more on "silver Saturday," than those individuals who stand off to themselves and say, "That's the darnedest, luckiest man I ever did see."

Schedule of Prices in Uinta County, Wyoming.

W. T. LANE.

Horse shoeing, smooth, No. 0 to No. 3	\$1.50
Horse shoeing, hand calked, No. 0 to No. 2	1.50
Horse shoeing, hand calked, No. 3	1.75
" " " " " 4	2.00
" " " " " 5	2.25
" " " " " 6	2.50
Setting tires up to 3½ inches, each	1.00
Setting tires up to 3½ inches, per set of four	3.00
Setting tires up to 3½ and 3¾ inches, each	1.25
Set of new buggy tires	\$9.00 to 13.00
Setting boxes, each .....	.50
Setting new spokes .....	.35 to .50
New felloes .....	.40 to .65
Pointing and sharpening plows .....	.75 to 1.50

"King Solomon's Smith."

And it came to pass when Solomon, the son of David, had finished the Temple of Jerusalem, that he called unto him the chief architects, the heads of artificers and cunning workers in silver and in gold, and in wood and in ivory, and in stone.—Yea, all who had aided in rearing the temple of the Lord, and he said unto them, "Sit ye down at my table; I have prepared a feast for all my chief workers and cunning artificers, stretch forth your hands, therefore, and eat, and drink, and be merry. Is not the laborer worthy of his hire? Is not the skilled artificer deserving of honour? Muzzle not the ox that treadeth out the corn."

And when Solomon and the chief workers were seated, and the fatness of the land, and the wine and oil thereof were set upon the table, there came one who knocked loudly at the door, and forced himself even to the festal chamber. Then Solomon, the king, was wroth, and said, "Who and what manner of man art thou?" And the man answered and said, "When men wish to honour me they call me 'Son of the Forge,' but when they desire to mock me, they call me 'Blacksmith,' and seeing that the toil of working in the fire covers me with sweat and smut, the latter name, O King, is not inapt, and in truth, thy servant desires no better." "But," said Solomon, "why came ye thus rudely and unbidden to the feast where none, save the chief of the workmen of the temple, are invited?" "Please ye, my lord, I came rudely," replied the man, "because thy servants obliged me to force my way, but I came not

unbidden. Was it not proclaimed that the chief workmen of the temple were invited to dine with the 'King of Israel?'" Then he who carved the cherubim said: "This fellow is no sculptor"; and he who inlaid the roof with pure gold said: "Neither is he a worker in fine metals"; and he who

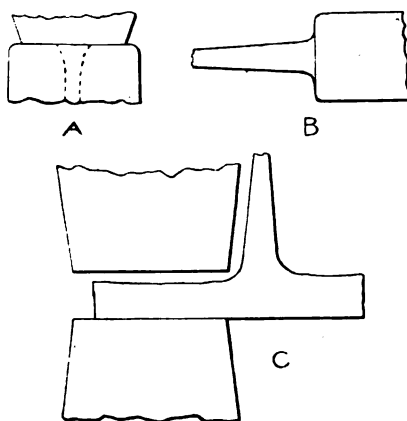


FIG. 37. METHOD OF DRAWING DOWN STOCK FOR VALVE YOKES.

raised the walls said: "He is not a cutter of stone"; and he who made the roof cried out: "He is not cunning in cedar wood, neither knoweth he the mystery of uniting pieces of strange timber together." Then Solomon said: "What hast thou to say, Son of the Forge, why I should not order thee to be plucked by the beard, scourged with the scourge, and stoned to death with stones?" And when the Son of the Forge heard this he was in no sort dismayed, but advancing to the table snatched up and swallowed a cup of wine, and said: "O King, live forever. The chief men of the workers in wood, and gold, and stone, have said I am not one of them, and they have said truly. I am their superior, and they are all my servants." And he turned him round to the chief of the carvers in stone and said: "Who made the tools with which you carve?" and that one said, "The Smith." And he said to the chief of the masons: "Who made the chisels with which the stones of the temple were squared?" and he said, "The Smith." And he said to the chief of the workers in wood: "Who made the tools with which you hewed the trees in Lebanon, and formed them into the pillars and roof of the temple?" and he answered, "The Smith." And he said to the artificers in gold and in ivory: "Who made the instruments by which you work beautiful things for my Lord the King?" and he answered, "The Smith."

"Enough, enough, good fellow," said

Solomon, "Thou hast proved that I invited thee, and that thou art all men's father in art. Go wash the smut of the forge from thy face and come and sit at my right hand. The chief of my workmen are but men. Thou art more."

So it happened at the feast of Solomon, and smiths have been honored ever since.

The Railroad Blacksmith Shop.—9.

Making a Valve Yoke.

W. B. REID.

The second method of making valve yokes is slower, but is largely preferred, as it presumably overcomes the objection of cross-grain in stem. Proceed as in first method, (see article in June issue) or with a forged bar of right size, draw down stems and cut off pieces of suitable size, (Fig. 37, B). With second heats, these are drawn down under steam hammer in die or tool having a hole of suitable size for stem, using a round fuller or piece of iron for the purpose (Fig. 37, A). Pinch the piece out and drive together upon side, repeating operations until drawn out to right dimensions. Operations may be hastened by drawing out between hammer dies as in Fig. 37, C, using a tool similar to that shown in Fig. 35, C, (but with a round close hole clear through instead) to give proper taper (Fig. 38, A). When made in this way the stem should be left a little longer than depth of hole so as to strike the bottom. Should this not be done, a weak, atten-

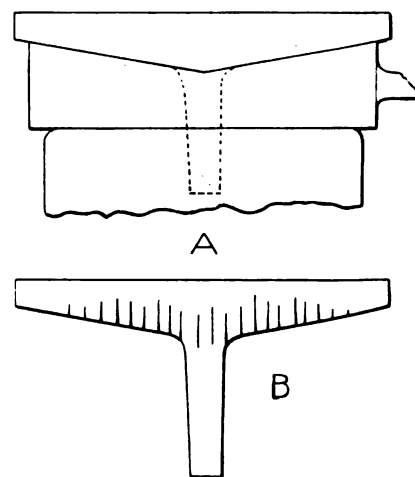


FIG. 38.—A. TOOL USED FOR DRAWING OUT. B. RESULT OF WORKING IRON TOO COLD.

uated or "strangled" effect results at base of stem, caused by the stem and body of iron recoiling from each other at the heavy blow of steam hammer. This defect may often be observed also, in the stems of motion link saddles made in the same manner.

The quality of forging in this method, also, is very often greatly impaired by working the iron too cold, the result

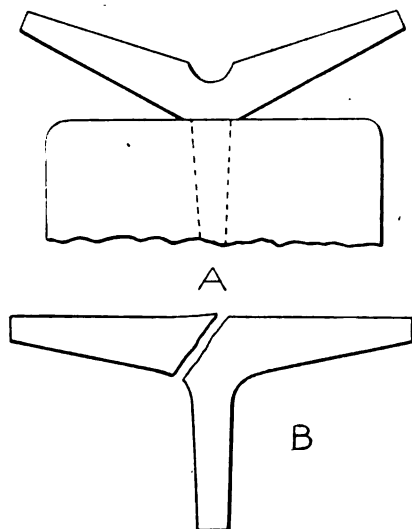


Fig. 39. TWO UNSATISFACTORY METHODS OF MAKING A VALVE YOKE.

being a tendency of the iron to crack perpendicularly across as in Fig. 38, B, a condition even more inferior than a tendency to cross-grain in a contrary direction.

Third method: Yoke backs are sometimes made by splitting and spreading the iron as in Fig. 39, A. Although producing a very strong result, this method is too slow, tortuous and expensive to be very largely practical.

Fourth method: The worst method we have seen described is that in which the yoke is welded as shown in Fig. 39, B. A frequent necessity in the life of a yoke is the renewal of the stem. A yoke made in this way would hardly stand this operation, if it should, fortunately, last long enough to reach this stage of valve yoke history.

Fig. 40, A, illustrates a method in which the entire yoke is forged in one piece, turned and welded at point D, Fig. 40. The preliminary process being that shown in Fig. 39, A. Whatever advantage this method may be supposed to possess, is altogether offset by its expensiveness and the probability of the iron being tortured and strained in the course of forging so intricate and unwieldy a piece.

It is very inferior practice to weld a valve yoke at corners as shown in Fig. 40, C. This method of weld, like that shown in Fig. 39, B, is of the most precarious and unreliable kind; especially so, should the yoke be machined in the inside surface, which is most frequently done. The method of weld shown in Fig. 36, B, will be found the most practical, expeditious and reliable.

The method of making a complete valve yoke, or other forging, should largely be determined by a practical estimate of the strain or resistance the part is calculated to endure in actual service. The work a valve yoke has to perform is not of a violent or strenuous nature. The average breakage is small compared with the necessary renewal of worn valve stems. A method of manufacture offering a reasonably safe margin of strength at a low, if not minimum cost, is a practical one.

(To be continued.)

Beginners in the Blacksmithing Craft.

WM. P. DAVIS.

My first thoughts of being a blacksmith came to me when I was about twelve years old. I used to take my fathers' horse to the shop to get him shod, and what there was about the old shop or the hard and dirty work which should attract me I cannot tell, but this was my thought, that I would be a country blacksmith. I had no ambition to go to the city, or to work as journeyman, but to have a shop of my own and do jobbing for my neighbors.

When I was twenty years old I began working for a blacksmith who was to teach me as fast as he could, besides boarding me and giving me twenty-five dollars for one year. You will laugh at the wages I was to have, but I was not

hundred and fifty dollars and let me have it to go with. Let me say right here that I sent it all home to him in one year. The first man I hired with there was a blacksmith from Maine, a smart little fellow, weighing about 135 pounds. He took me into his family and I had a good home. He gave me \$300 for one year, not agreeing to teach me anything, but to make me useful to him. I worked the year through and you may be sure that I learned something, for he raised my pay to \$420 the next year, in addition to my board. I worked for him two years and more, not only at the fire but I used the sledge too. Then I went sledging in the navy yard at \$3 per day. After three years I came back to my old home in Maine. This was my beginning in the blacksmith trade.

Now I know that all over the land there are young men who are starting in to make their homes and living by this trade, and to these I would give a few words of advice. Many are located away from the privileges which are to be had in the city. Many have not the means to put in power and machines which they would like to and which would pay. To this class I wish to speak. First of all keep your credit good and your promises sure. You will find in after years that it is worth a great deal to you. Treat all people courteously. Do not allow yourself to get angry under any circumstances. The man who

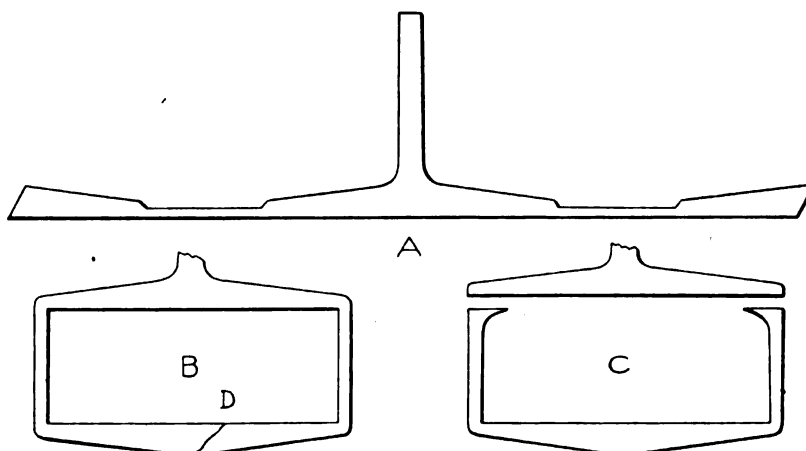


Fig. 40. METHOD OF FORGING AN ENTIRE YOKE IN ONE PIECE.

after money then—I wanted the experience. I commenced in good earnest but I worked only three months. I had to do the hardest of work, such as I already knew how to do and was not given any instruction at all, so I went back again to my father's farm. Farming had no attraction for me. The next spring I determined to go to California. I had no money and my father had none; and although I was not yet twenty-one years old, my father borrowed one

governs himself can govern others. Do your work honestly and charge a reasonable price. If your prices are too high, you will drive the work to other shops; and if too low, you will fail. Learn to do your work quickly and do it well. Watch your chance for buying tools, often you will have a chance to get tools cheap of men who are going out of business. Keep your tools in readiness for any job that may come, repairing and sharpening them when other work is slack.

Make your shop comfortable for those who have to wait; have a few chairs and a good fire (when cold) and the papers handy. Do not oppose a man too vigorously, you can convince him better by mild and pleasant language. Arrange your forge so as to get any kind of long iron in the fire. Keep all metals which would hinder welding (such as lead and tin), away from your forge fire. Decide what you are to do with your iron (when hot), before heating and have your tools handy. You cannot get a good heat under your fire where the wind blows on to your iron, nor can you get a good heat on top of the fire; but to get a good, clean heat have a clean fire, and have it all around the iron. See that the fire does not get hollow under the iron. I am aware that these suggestions will seem simple to the old smiths but there are many little things which bother the beginner.

Finally, the beginner should try to put his very best into his work. He cannot be too much in earnest. The great thing lacking in most craftsmen of the present day is earnestness and enthusiasm. When customers see a man interested in his work and always busy, they come to consider him a good man. They believe he is going to try his best. The fact of his being busy goes to show that he has plenty of work and hence, that other people believe in him and bring him their jobs. With practice will come the ability to fit in different odds and ends of work so that very little time or fire or material will be wasted, and the consequence will be more profit.

A Few Hints on Clipping.

BY M. M.

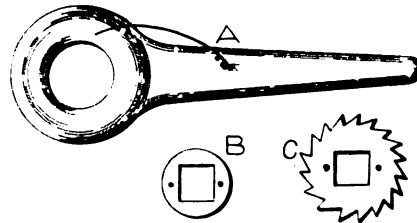
Many smiths have introduced into their shops an apparatus for clipping horses, and this may be made a source of profit under proper conditions. But like everything else, the man who undertakes it should know something of the principles of the work he is going to do.

It is folly to suppose that all horses should be clipped. No animal with a tendency to skin disease should ever be clipped, but where the general health is good, both old and young horses may be greatly benefitted by the operation. The process, however, should be as quick as possible.

The horse in his long winter coat, perspires freely when at work, and soon becomes soaked with sweat. When greatly fatigued and the circulation weak, it may take hours for his skin to become dry. In such cases the long

continued evaporation keeps the surface cold and not only induces obstinate skin diseases but may seriously impair the health of the internal organs by leading to congestion and inflammation.

When horses are in favorable condition to be clipped, the process affects them noticeably and beneficially. The appetite improves, their spirits are



A NEW AND INTERESTING MODEL OF RATCHET WRENCH.

greatly heightened, and they become more active and jaunty, throwing off any sluggish tendencies that they may have exhibited previously. In fact, the whole constitution is improved, and they can accomplish a far greater amount of work with less fatigue than when unclipped. It is, therefore, a point of economy to rid the animal of his long coat.

Of course, care should be taken to choose the right season for clipping. Some owners, when the month of October is mild and open, allow their horses to go until November before clipping, in which case an entire new coat is developed, but the wisdom of this is very questionable. It is, to my mind, a wiser policy to remove the coat while the weather is yet mild and before the new hair has had time to develop. The horse that is to be clipped might just as well be clipped earlier, thus to avoid any injury from possible changes of



A USEFUL FORM OF PIPE CUTTING TOOL OF ORIGINAL DESIGN.

temperature. Besides, the effects of clipping are then less severely felt, and the increasing cold is better tolerated than when the process is left until later.

Some persons who shun singeing, are in favor of clipping two or three times in the course of the winter. But the clipping should not be done closely, or else, after the second or third time, serious consequences can be avoided only by greatest care.

With attention to the above hints (which I believe all practical horsemen will second) clipping may be considered a good thing. The blacksmith who

would make a success of it should bear in mind these points for the benefit of his patrons.

A New Form of Ratchet-Wrench for Tire Bolts.

In last month's paper, under Queries, Answers, Notes, appeared an item by Mr. G. L. Coleman, concerning a very ingenious form of ratchet-wrench devised by him. The sketch was then omitted, but, being quite interesting enough to warrant a more minute description, we herewith reproduce the sketch and further details as to construction.

Forge a piece of steel as shown at A, from stock 1 by 1½ inch, with an inch hole in the head. Another part, B, is next forged, 1½ inch wider than the first. The next step is to cut it out, as indicated, making it from some old mower section or other light steel. Place the two pieces together, put a ratchet on each side and rivet together. Adjust your spring, and the wrench is complete.

Such a tool is simply made, convenient and a great help towards saving labor.

A Useful Form of Pipe Cutting Tool.

B. E. PEASE.

The figure which accompanies this article shows a tool which is of great service as a pipe cutter for large iron pipe and boiler plates. It is forged like a cape chisel except the end, which is left square and cut off at a bevel as shown. The longest side has the corners ground or filed off as illustrated and the temper is drawn the same as a cold chisel.

This is a very useful tool in the shop when it is necessary to enlarge a hole in iron on one side, or to change the posi-

tion slightly, as is the case in repair work. It does the work much better than a round file and can be used when a file cannot. I find that several sizes can be made to advantage.

The blacksmith who once uses this tool will understand why I recommend it for cutting pipe and boiler plates or enlarging a hole as described. He will not be without it.

The Patience of the Horse.

Whether the horse is intelligent or not is an undecided point. Some people claim that he is the most intelligent and

faithful of animals, while others declare he has not an atom of common sense and that his only instincts are of self preservation and self-comfort.

Be that as it may, nobody can deny his great patience. Nature has made him peculiarly dumb. He cannot complain. He must submit to every kind of usage. He may be driven painful miles on shoes that are all wrong, and if he raises any objection he very likely gets the whip. He is brought to the forge, and the sights and sounds and smells fill him with horror in remembrance of a former unpleasant experience in a like place. He begins to rear and plunge and is at once termed vicious and treated like a criminal. Submit, he must soon or later, although he has not enough intelligence to profit by a lesson in corporal punishment, but only to dislike the forge more and more.

He jogs through life obeying every word and gesture, silent and uncomplaining as any machine. He stands long hours in all kinds of weather. He takes what comes his way, eats what is placed before him, and does the work that is set for him to do. Then when he is quite used up and can work no more, he is just put out of existence. It is doubtful if any other living creature is so utterly a slave as the horse.

A Correspondence School Graduate as a Progressive Blacksmith.

Situated on lower Main Street, in the little hamlet of Rogersville, town of Dansville, New York, is a modern blacksmith and woodwork shop owned by Mr. Byron Wallace. The woodwork is done by Mr. Wallace, the shoeing entirely by his son, Fay, a youth of twenty, who holds a diploma from the International Correspondence School, of Scranton, Pa.

Mr. Wallace is a subscriber to many scientific papers and boasts of having every number of THE AMERICAN BLACKSMITH ever issued.

Among the tools in the wood-shop are an 8-foot bed, 13-inch swing, reversible feed and swivel rest, power and foot lathe, manufactured by W. F. & S. J. Barnes, Rockford, Ill., a No. 7 Barnes Jig Saw, a Union emery grinder, carrying two wheels driven by power made from a bicycle, a Koch Universal tenon

and boring machine made by the Koch Manufacturing Co., Montezuma, Iowa, and other useful tools.

The young smith uses an Eagle anvil from the Eagle Anvil Works, Trenton, N. J. The Green River horse-shoers' and bolt heading vise made by Wiley and Russell, Greenfield, Mass.; the S. and R. back gear tire bender; the Silver Advance drill No. 12 of the Silver Manufacturing Co., Salem, Ohio; the Western Chief, No. 14 drill of the Canedy-Otto Manufacturing Co. of Chicago Heights, Ill.; the Bicknell shear made by the Bicknell Hardware Company, Janesville, Wis.; and the Antikink tire upsetter are also part of the equipment. Last but not

shafts by making the two bolts $\frac{1}{2}$ inch longer, on which to fasten the attachment L. I will not give any sizes or lengths, as they must be made according to the size of shafts and pulleys.

A is the arm of hanger, made of wrought iron.

B, a piece of gas pipe, which goes in between the arms.

C, a bolt which passes through both arms and the pipe.

D, nut for lock bolt.

E, set screw which goes through arm and against box.

F, lock nut for set screw.

G, piece of pipe for boxing, which should be three times as long as the diameter of shaft.

H, babbitt metal, which is run in.

J, lock nut for holding oil cup, which can easily be taken out to clean.

K, is the oil cup, made of tin with handle riveted on.

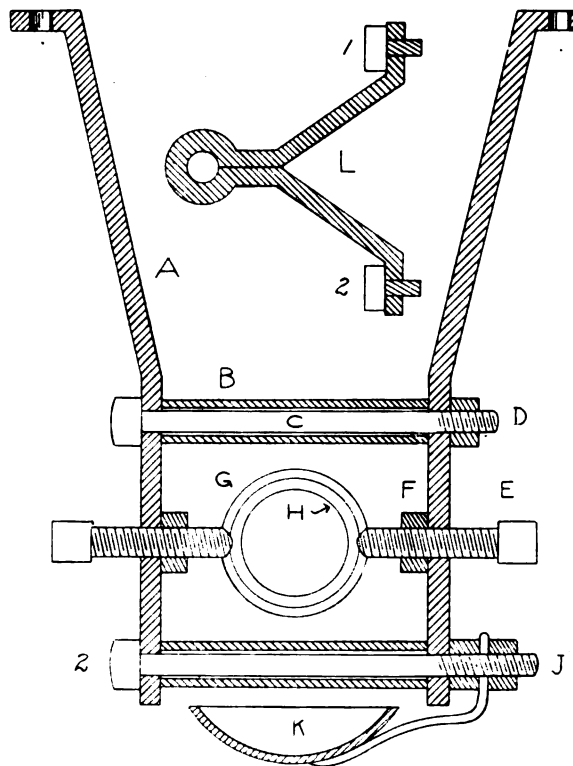
I cut threads in the arm, where the set screws go through. The oil cup should be an inch or so longer than the box. The easiest way to babbitt these boxes is to have a piece of wood turned $\frac{1}{2}$ of an inch larger than the shaft with a shoulder somewhat larger than the outside of box. Stand it on end and put a little putty around the bottom of the box to keep the babbitt from running out, and you will have no trouble in making a good job. Bore an oil hole in the top, and on opposite sides bore holes for the points of the set screws, so as to adjust the box for lining up. By this arrangement of the lock nut, you can move the shaft from right to left and lock it up tight when in place.

At L is shown a guide for shipper lever, the bolt heads 1 and 2 being the same in each figure.

In lining up a shaft, I first put a spirit level on each hanger and lower first the highest and then the next highest and so on until I have them all level. Now hang a plumb at each end, just touching the shaft on the same side. Take a third plumb and go to each hanger and adjust the shaft sideways until it lines up with both ends.

Now that every progressive smith is putting in power of one kind or another, the shaft hanger is a very important item of the shop machinery. There are shaft hangers and shaft hangers of many designs.

This makes the best hanger for the least money and works the best that I



A VERY CONVENIENT FORM OF SHAFT HANGER.

least is the 17-pound foot hammer made by father and son, adjustable to any part of the anvil.

This smith is greatly in favor of the Lein Law and is doing all he can to actively help along the cause. He is very earnest in his work and has shown considerable pluck in starting up his shoeing shop in his own town within a short distance of four other shops.

A Shaft Hanger of Useful Design.

JAMES H. JENSEN.

The accompanying drawing shows a shaft hanger, which I recently devised. It may be of interest to the blacksmith who is putting in power. It can be used for line shafts, and also for counter

have ever seen. All that the smith needs to buy are three pieces of pipe and an oil cup. The rest he can make from scraps in the shop and ends of new tires. If I had known about this before I started my shop, I could have saved \$100.00 in hangers.

A New Shoe for Trotters.

Something new in the way of shoeing mixed-gaited horses has been brought to notice by the *Horse World*. For some time the problem of trainers has been how to shoe such horses to make them trot properly. The problem has apparently been solved by an Englishman, Mr. W. H. Lake. This gentleman, while at Memphis, studying American methods of training trotters, has been working out a series of experiments in this line, arriving at a most satisfactory result.

The shoe used is just an ordinary one with two small, square steel bars welded on the top surface, one placed from one to two inches back of the toe and the other the same distance from the heel, clear across the shoe. The relative position of these bars determines the effect on the horse's action, and experiments have shown that different horses need the bars in different positions. Many Memphis trainers have tried these shoes and in no case have they been known to fail. It is rather remarkable that an Englishman should have solved a trotting problem that has so long puzzled American trainers.

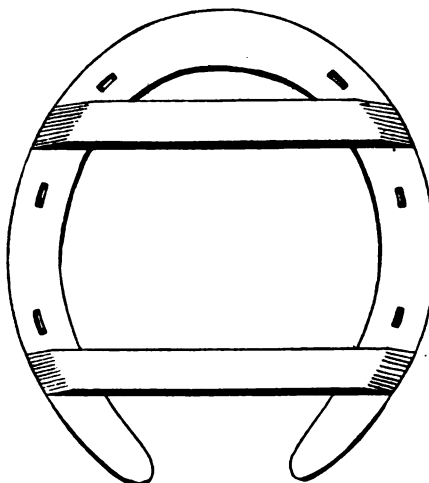
The accompanying illustration is from a reproduction of a sketch of the shoe that appeared in the *Horse Review*. The bars are here placed one and one-eighth inches respectively from the heel and the toe.

A Few Words About Hoof Lameness.

BY W. B. A.

"My horse has gone lame," is a familiar sentence to the horseshoer, and often enough the very tone in which it is spoken plainly says that of course no one but the shoer is to blame. There are many causes of lameness; for some of which the shoer is at fault, for others the driver, while in many cases the lameness is a result of pure accident. But of course the shoer generally comes in for the blame. As lameness is so constantly being met with and is caused by so many different things, a few words about it should interest my fellow-craftsmen. I shall not consider, however, the lameness connected with the various forms of hoof disease.

Lameness itself is a symptom of trouble somewhere. Lameness means pain to the animal, and pain is nature's warning which should never be neglected. Shoers should always bear in mind that lameness arising from wounds liable to infection, will, when neglected, almost invariably be followed by serious complications, often resulting in the loss of the animal. Hence, even the slightest evidences of lameness should be promptly and thoroughly investigated. The location of any soreness causing the animal to go lame is most quickly detected by slight pressure with the pincers in suspected locations, until



THE NEW "MEMPHIS" SHOE FOR TROTTERS.

the evident pain shown by the animal during the operation enables the extent and position of the sore and sensitive parts to be learned. This method applies also for locating soreness at any part or parts.

One common cause of lameness is an uneven pressure of any kind on the hoof, and this may come about in a variety of ways. When a foot is sound, the shoe should be fitted to an even bearing at all points, so that the weight will be uniformly distributed. If the shoe is fitted so that the weight is concentrated at any one point or points, the result will be a bruising of the sensitive sole, with resulting inflammation and lameness. In bringing the hoof to a perfectly level bearing, hot fitting is practiced, and while there is no objection to such method of fitting rightly done, it becomes very harmful when carried to excess, and defeats its very object. If the shoe is too hot or is allowed to remain in contact with the foot too long, injury to the sensitive parts, especially at the toe, is sure to result, with consequent great pain and lameness and perhaps separation of the sole from the quick.

This injury is of course more liable to occur when the horn is thin or has been excessively pared. It is due solely to carelessness or ignorance on the part of the farrier, and its remedy should be preventative.

If any part of the foot is allowed to grow unduly long, the weight becomes improperly distributed, the bones and tendons of the foot are put under unnatural strains which is liable to cause soreness. The heel, toe or quarter which is too high receives the jar and first weight in landing and bruises or corns are in order. The shoer should constantly be on the lookout to get a level bearing and equal distribution of the weight on the foot as a horse travels.

Since excessive local pressure is apt to cause inflammation we may expect to find calks, and also improperly fitted clips giving trouble, and such is the case. In the case of calks, if a foot as it travels strikes the ground at but three or four points, the shock of landing will be transmitted to the foot immediately above and in the region of the calks, so that the entire wall does not share in taking the pressure as it should. It is just the same as if the foot were held stationary and struck with a weight equal to that portion of the horse's weight which that foot bears in travelling. The effect of the shock would be taken up by the portion of the wall in the region of the calk. It can easily be seen how injury and bruising can take place in this way.

When toe clips or side clips are badly formed there is pressure on the sensitive foot, and lameness often results. Direct wounds may even be caused when the clips are large and sharp and the shoe becomes loose. This brings us to consideration of cuts and wounds.

Pricking, as it is called, is not uncommon, and varies much in seriousness of effect. Of course, very often a nail may be driven so close to the sensitive parts, that while it does not penetrate them, it nevertheless sets up a pressure which shortly after shoeing causes lameness. When it is early detected and the offending nail removed, a short rest will generally restore normal conditions. Neglect may easily result in the formation of matter and serious injury.

Direct puncture of the sensitive foot often occurs, though now not so frequently as in the days of defective hand made nails, which are apt to split within the hoof. Pricking nowadays is chiefly due to thin walls, restless horses, lack of skill or improperly punched nail

holes. When by chance, the farrier perceives he has driven the nail into the sensitive parts, it should at once be removed and the lameness will be slight. If the nail is not withdrawn serious lameness will soon set in. The wound exposes the sensitive tissue to infection, and in neglected cases the inflammation may be so extended that pus will break out at the coronet, and even produce lock jaw. Such cases of infection from wounds should be taken in hand at once, and a small opening made, so that the matter may be permitted to escape. The cavity should then be washed out and disinfected, for which purpose a ten per cent. solution of carbolic acid is excellent. The cavity should be filled with absorbent cotton or even oakum, which has been soaked in the carbolic acid solution, and the foot protected from dirt and reinfection. Such treatment should be given once or twice daily as long as lameness or the formation of matter continues.

The Early Experiences of one Blacksmith.

HENSON GOOD.

I tried to learn the trade when quite young, at the age of ten or twelve. My father at different times sent me with our horses to have them shod, and I became interested in the work so deeply that on several occasions, upon reaching home, I very nearly got whipped for staying so long. Nevertheless I figured out a plan to do a little work. I found an old-fashioned cord bedstead with a wide head-board. I took the board and shaped a bellows out of it. Next was the leather, so I found an old table-oilcloth which I used instead. This did very well. I swung the bellows just the same as a large one, but I sawed out a small hole on top. I had a hand bolt fastened on top. I lifted up the top and when bearing down I placed my other hand over the hole. This was my first experience in blacksmithing in my father's old smoke-house. The work consisted of making heel plates, husking pegs and a few main springs for guns, etc., for our neighbors' boys.

We then sold out and moved away. I hired as a helper in a carriage shop in Lima, Ohio, bought a few second-hand tools and thought I would do our own work. I drove a few shoes on our own horses. One day our neighbor came up the road with a large team of gray horses and stopped at my shop. I stood back, feeling a little nervous. I tried to excuse myself, but he told me to go

ahead and do my best. The horses wore No. 6 shoes and had been shod but once before. I had really good luck, and from that time until the present, I drove 3,170 shoes, and did a few hundred dollars' worth of repairs.



The following columns are intended for the convenience of all readers for discussions upon blacksmithing, horseshoeing, carriage building and allied topics. Questions, answers and comments are solicited and are always acceptable. For replies by mail, send stamps. Names omitted and addresses supplied upon request.

Value Received—I made a foot power hammer from the description given in Vol. 1, No. 2, by L. Van Horn. It is worth five years' subscription to the paper.

L. B. STIVERS.

Tempering Moldboards—What is the best way to temper moldboards that have been through the fire? Is there an acid or some other ingredient to take off the scale that forms on the surface? I am unable to find anything myself.

CARL NORDHAUDEN.

A Contracted Hoof—I should like to know how to shoe a five-year-old horse which had a snag run in the frog of his hind foot about a year ago. The horse is not lame but the hoof is growing small and contracted.

J. W. GRIFFITH.

Tempering Rock Drills—In answer to Mr. Wm. Curry's inquiry for tempering rock drills I would say—heat slowly to a cherry red, dip in clear water, take out and watch temper run down to a straw color. Immerse under water until cooled off. This is the best I have ever found for hard rock. Try it.

GEO. R. YORK.

Tempering Rock Drills—In tempering rock drills, first heat to a cherry red, stick into lukewarm rain water, and then draw the temper to a blue in the center and a little harder on each corner. The cross drills are generally made a trifle softer than the common drills. Always use the best of steel.

J. W.

Babbitting a Journal—Will some one through these columns give me an easy and simple method to babbitt a journal, where the journal or axle is worn a little, say for instance a wind-mill journal, the bearing of which is twelve inches long? I have some trouble in this work, and should like to hear from some brother craftsmen.

A. J. K.

Square or Slanting Calks—I agree with Mr. D. Pekhat in what he says in the May paper about preferring the heel calk turned square under the shoe. I could never see the advantage of slanting them back, and if there is any I should like to know it. Perhaps somebody can give a reason. We may both be wrong.

J. ALLEN.

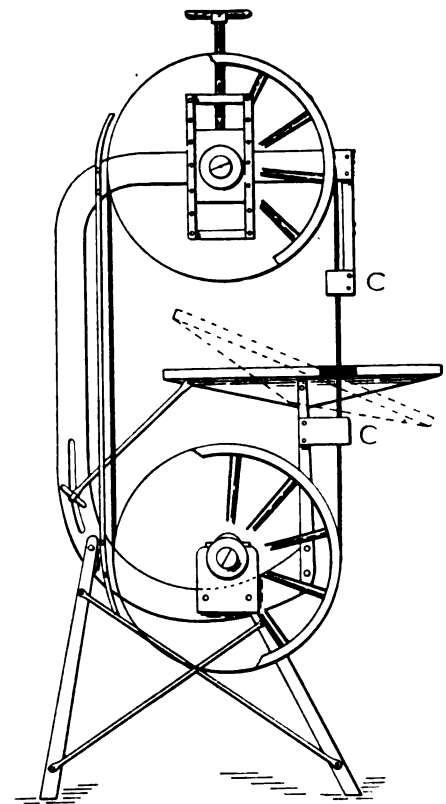
Shoeing for Corns—I would advise Mr. W. H. Doty to watch and treat the corns very carefully; also to keep the feet moist and try to relieve the contraction, which probably has much to do with the trouble. Shoe the horse so as to take as much weight off the affected region as possible. B.

Tool for Taking Out Old Flues—Will some brother smith please tell me how to make a tool for taking out old flues from boilers, as I have a great deal of that work to do, and I have not found any way except by the use of a cold chisel and hammer. If there is a tool on the market for that class of work, I should like to know about the same.

A. T. WRIGHT.

Errata—Referring to the article by Mr. Kenyon on page 158 of the May issue, Mr. Kenyon was wrongly made to say, for quarter cracks toe clips should be used, when in reality it should have been said that he favored toe tips. Also his article should be corrected to read that corns are never seen in a foot that is not contracted. This, too, was an error. THE EDITOR.]

Home-made Band Saw—I notice that Mr. Herman Schaffer desires instruction regarding a home-made band saw. I will give my experience in this line. I made a band saw, such as shown in the accompanying outline, using an old plow beam, a smooth one, for a back. The legs are



A VERY INGENIOUS HOME-MADE BAND SAW.

cultivator beams, the screw tightener was taken from an old Jones' binder and the two wheels are out of a press drill covered on the rim with rubber tires. The guides are simply made of brass with slots for $\frac{1}{4}$, $\frac{1}{2}$ and 1-inch band, and they are cut in so that the saw will fit as shown at C. This saw of mine will cut up to 9-inch stock. The table of course should be so constructed as to tilt to allow a bevel to be cut. This makes a useful machine and an inexpensive one.

WM. EXLINE.

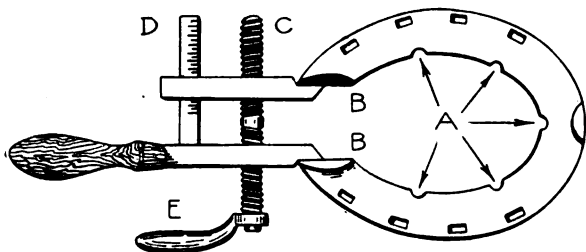
Tempering Mill Picks—I consider the hammering of a mill pick just as fine a job as tempering it. Never hammer the edge or corner but once, and that before you start to flatten, and after it is ready to temper, take a little cyanide of potash, heat to a dull red, rub on the potash, and then plunge in rain water not too cold. Draw the color to a light straw and your pick is ready for use. C. G. BURDICK.

Welding Springs—H. H. Whitten asks in the April issue how to weld buggy springs, I suggest the following method: Take one piece of spring, scarf it and weld on to it another piece of spring a little less than an inch longer. Now upset at the end and also upset the end of the other piece to be welded on. Then proceed to scarf and weld the spring carefully, and the job should stand. B. B.

Hardening Taps and Dies—Answering G. W. McCord's question about taps and dies that have been through the fire, would say that they can probably be hardened to get good service again by heating to a low cherry red, quenching in water and then drawing the color carefully to a dark straw color. This can be done by holding the tap over a piece of hot iron, turning it continuously and watching for the proper color before final cooling. A. B. C.

Building a Furnace—I have been a regular subscriber to THE AMERICAN BLACKSMITH since last November and can keep still no longer. I consider THE AMERICAN BLACKSMITH almost the acme of perfection for the craft in general. But what I want to know is, will some brother craftsman please tell me how to build a furnace for melting cast iron to make castings of one hundred pounds or less, as also the dimensions? A. E. FREEMAN.

Heel Expanding—Referring to the talk by Mr. R. C. Menzies in the April issue about heel expanding, perhaps my method will be of interest to him. I first make a shoe with small flanges at the heel. Referring to the illustration, AA are half round holes bored or filed out so that the shoe



A NEW DEVICE FOR HEEL EXPANDING.

when expanded will not return to its old shape. BB show heel flanges which go in between the heel. The tool which is used for expanding is also shown, C being a screw threaded right and left handed, and D a flat piece marked off in eighth inches. E is the key. The hoof must be treated first, in order to soften it, after which it is to be levelled as much as possible and the flanges fitted between the heels. Every week by means of the expander, widen the hoof an eighth of an inch, keeping the hoof soft all the time. M. KOEPLINGER.

Welding Toe Calks—In welding toe calks or in fact anything else that will not weld, I use the following remedy. Take for instance a toe calk that sticks on one end and not on the rest. Take a horse nail stub, cut it short, flatten the pointed end

and drive between the loose end of the calk and the shoe, take another weld and see how easy it sticks. The same method can be used in welding springs, or stubs, or old sleigh shoes. C. G. BURDICK.

Steam Hammer Trouble—Replying to Mr. Carl A. Gillen in the May issue, I should say the first thing to be done is to get at the trouble which causes the piston to jar loose. If it is due to water in the cylinder, the steam piping and drains should be looked to. The piping should be covered, and should also be as short and straight as possible, avoiding bends and elbows, and especially dips or pockets where water can collect. The piston head itself should be carefully examined, and securely bolted and locked on the rod. This remedy should answer. B. B.

Relieving Strains—I see W. F. asks in the April AMERICAN BLACKSMITH if it does any good to heat a weld on which there is considerable strain, to a dark red and then to cool slowly. It is my experience that heating to a low heat and allowing to cool very slowly relieves strains which have been caused by sudden heating or cooling. This is especially true with steels, but if a weld in iron is allowed to cool slowly in the first place, I don't believe it helps any to heat again and allow it to cool. I should like to hear from some of the boys on this point. F. W. B.

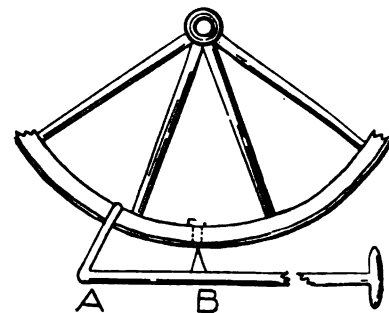
Setting Wagon Skeins—I notice in the May issue of THE AMERICAN BLACKSMITH, Mr. Hopkins' explanation of how to set wagon skeins. I have set wagon skeins and made axles for twenty years and his theory will not work, or he did not explain it fully. If you take one-half the diameter of wheels, say four feet eight inches and three feet ten inches, the front axle and the hind will not be alike and if you stand them on plumb spokes the wheels will not track. Please explain this. S. S. HERSHEY.

An Interesting Letter—We find THE AMERICAN BLACKSMITH of much help. We have power in our shop, and best of all powers is a water power. We do more woodwork than ironwork. Our forge, etc., are in a separate room, and we run everything by power except the fan, which would not pay as we do not use the fan all the time. We build a lot of heavy and also light single beam logging sleds. We also get out piazza posts, moldings, brackets, and in fact everything made of wood. As to iron we repair and make hammers but we do no horseshoeing. These are our principal lines. OTIS GODING & SON.

Lister Sharpening—In order to prevent warping in lister lays, turn the lay up side down, place the compass across the heels. Be sure to hang the compass up where it will not be moved. Now proceed to sharpen and set the lay, paying no attention to the warp until this is finished. Place the compass across the heel the same as at first and perhaps it will show $\frac{1}{4}$ or $\frac{3}{4}$ of an inch of warp. Put the lay upside down in the fire and heat to a cherry red across point of V and both throats alike. Place in the vise with the point up and be sure one jaw rests firmly on point of V and the other will touch the center of each throat. Press gently until lay opens to size shown by compass and you can

guarantee it will fit the plow. I leave the lay in the vise until cool. I have used this method for ten years and have never had a failure. N. M.

An Improved Tire-bolt Holder—In looking over the AMERICAN BLACKSMITH of February, 1903, I find several useful tools of Mr. C. S. Simmons' invention. I notice the tire-bolt holder, which is very good. I shall endeavor to show one of my own make that I have used for twenty years,



A VERY USEFUL FORM OF TIRE BOLT HOLDER.

which I think has some advantages. In the first place, it is much more quickly applied. In the second, the point bearing on the bolt head is chisel-shaped and will hold the bolt until the nut twists off.

Take a piece of steel tire or sleigh shoe, 1 by $\frac{1}{4}$ inch by 2 feet and turn down at right angles, as at A, three inches of the end. Then bend the other way a rounding hook or loop. Two inches from the bend, A, weld on a steel nipple, B, one inch long, made of $\frac{3}{4}$ -inch tool steel. Draw down to a sharp chisel edge, harden and temper. Draw the other end with a taper and turn a handle on the end, when the tool is complete. A bend on offset between A and B will bring the point under the bolt.

With the tool in place and the breast upon the end you can hold any bolt. Friend Simmons' grip or thumb screw has a short or center punch point which allows a bolt to turn easily. A light tap of the hammer will settle this tool in the bolt head and hold it securely. J. F. M.

Horseshoeing—When shoeing a horse, his foot should be pared on the bottom to a feather edge, after which run the rasp around the edge of the hoof to knock off the feather edge. Now fit the shoe perfectly. Do not fit the next shoe for the opposite foot by the shoe you have made, for the feet may not be the same shape. I have seen a great many horseshoers do this, and if the shoe should not fit the opposite foot they will rasp the foot to fit the shoe. The following is my way of shoeing: First remove the old shoes, pare all the feet and then fit each shoe to the foot. I always mark each shoe, so that I know which foot it goes on. By this method I don't have corns or contracted feet.

I have read a great deal also about interfering and I would say that I have been very successful along this line, and have never failed to stop the same after a second trial. The feet of most horses which interfere are out of balance. The way to stop this is by rasping the foot level, and with the paring knife cutting the foot a little. If the foot is low on the inside, don't pare that side more than level, and if there are any long points, rasp to natural shape. If this does not stop it, I use my judgment as to what kind of shoe to use, there being several kinds, according to the shape of the foot and the part the horse strikes with. These hints are from my own experience. L. R. GILL.

Prices Current — Blacksmith Supplies.

The following quotations are from dealers' stock, Buffalo, N. Y., June 24, 1908, and are subject to change. No variations have occurred since last month's figures.

All prices, except on bolts and nuts, are per hundred pounds. On bars and flats prices are in bundle lots.

$\frac{1}{2}$ in., round or square; Iron, \$3.10; Steel, \$2.90	
$\frac{3}{8}$ in., " " " " 2.70 " 2.70	
$\frac{1}{2}$ in., " " " " 2.50 " 2.40	

Flats—Bar and Band.	
$\frac{1}{4}$ x 1 in., Iron, \$2.50; Steel, \$2.40	
$\frac{1}{4}$ x $1\frac{1}{2}$ in., " 2.40; " 2.40	
$\frac{3}{8}$ x $1\frac{1}{2}$ in., " 2.00; " 2.00	

Norway and Swedish Iron.	
$\frac{1}{2}$ in., round or square, \$4.90	
$\frac{3}{8}$ in., " " 4.50	
$\frac{1}{2}$ in., " " 4.90	
$\frac{3}{8}$ x 1 in., " 4.80	
$\frac{1}{2}$ x $1\frac{1}{2}$ in., " 4.20	

Horseshoe Iron.	
For No. 1 shoe, $\frac{3}{4}$ x $\frac{1}{2}$ in., \$3.40	
For No. 2 shoe, $\frac{3}{4}$ x $\frac{1}{2}$ in., 8.00	
For No. 8 shoe, $\frac{3}{4}$ x $\frac{1}{2}$ in., 2.90	
For No. 4 shoe, $\frac{3}{4}$ x $\frac{1}{2}$ in., 2.90	

Toe Oak Steel.	
$\frac{1}{2}$ x $\frac{3}{8}$ in. and larger, \$3.50	

Spring Steel.	
$\frac{1}{2}$ to $1\frac{1}{2}$ in. Rounds, Op. Hearth \$4.00, Crucible \$6.00	
$1\frac{1}{4}$ to 6 in. by No. 4 gauge to $\frac{1}{2}$ in. Flats " 4.00, " 6.00	

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Blacksmith and Wagon Makers' Supplies,
PEORIA, ILL.

PADDOCK-HAWLEY IRON CO.
Iron, Steel, Carriage and Heavy Hardware,
Trimmings and Wood Material. . . .
ST. LOUIS, MO.

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Want and for sale advertisements, situations and help wanted, twenty-five cents a line. Send cash with order. No insertions of less than two lines accepted.

FOR SALE—Blacksmith shop and residence. For particulars call on or address:
MACK THOMAS, Curtistville, Ind.

FOR SALE—House, blacksmith shop, stock and tools. Good location. No competition.
B. ELKMAN, Williams Bay, Watertown, Wis.

FOR SALE—One Henderson cold tire setter, complete, same as new; never used any to speak of. \$75.00.
ALLEN P. ELY & CO.,
1110 Douglas St., Omaha, Neb.

KOLLSAVER—The new fuel saver; saves on your coal bills 25 to 40 per cent. Write quick, send stamp for trial package and particulars.
E. S. THACKER, Agent, Groton, N. Y.

FOR SALE—Blacksmith shop and tools, gasoline power, wagonmaker's tools, all in first-class condition. No competition within five miles, good business, good prices. For further particulars apply to
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FOR SALE—Our carriage factory of 25,000 feet floor space, frame building with machinery for manufacturing wagons and carriages. The price will be low for the purchaser. Reasons for selling, wish to retire.
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WANTED—We invite applications from those desiring steady employment, at good wages, as first class machinists, wood workers, blacksmiths, painters and trimmers. Experienced men in wagon and carriage manufacturing. Address:
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FOR SALE—One No. 4 Egan Hub Mortiser and Borer; one No. 0 Defiance Double Drum Polishing Machine; one Lane & Bodly Sixty-ton Hydraulic Wheel Press; one Cam Press or Hub Press, power feed. The Mortising machine is supplied with two sliding tables, one for hub mortising, the other for plain mortising. Further particulars upon application to
NESS BROS. & CO., York, Pa.

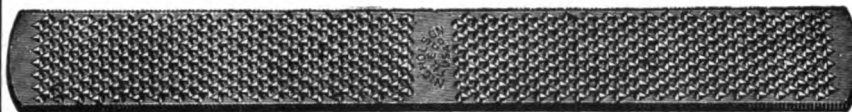
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Also new treatise on all the new steels and seventy-five new methods and recipes for forging and welding on machine and plow work, all the secrets in plow making and repairing and ten new steel welding compounds for different kinds of steel, also Thermite Welding fully explained, it welds solid in the twinkling of an eye.
All the above for One Dollar. Samples free.
Forty years a factory steel worker.
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NICHOLSON FILE COMPANY

PROVIDENCE, R. I., U. S. A.,

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**FILES AND RASPS**

Blacksmiths Recommend our Rasps.

BECAUSE*Their Wearing Qualities Have Been Proven.*Over 20,000 Sets Sold **AND MERIT SOLD THEM****"SPRING" BRAKE BLOCKS****For Carriages, Wagons and Trucks**

12 Sizes for Tires from $\frac{3}{8}$ in. to 5 in. wide. Wear shoes fitting these blocks adapted to either Steel or Rubber Tires.

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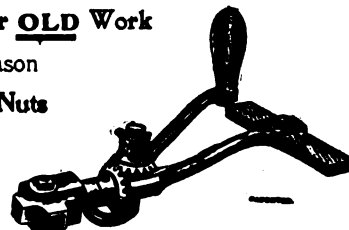
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The most **CONVENIENT** Wrench for **NEW** or **OLD** Work

Will save its cost many times in one season

Will put on or take off **QUICKLY** $\frac{1}{2}$, $\frac{3}{4}$ and $1\frac{1}{2}$ Nuts

For sale by all Heavy Hardware Jobbers, or will be sent to any part of U. S. prepaid for

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All Drills 7-32 inch and larger are 6 inches entire length.



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TO THE FRIENDS AND READERS OF "THE AMERICAN BLACKSMITH":

We desire to express our thanks and appreciation for the many regrets and offers of assistance which have come to us since the burning of our offices on June 19th last. New and better quarters have been secured, and our efforts will be directed to making the paper better and more valuable to our readers than ever.

Just at the present time, of course, it would help us greatly to have a prompt settlement of all subscription bills. We should like all readers whose subscriptions expire this month to send in their renewal orders at once.

A bill will be sent in this copy of the journal to any who may owe for their subscriptions, and we are sure we can count on a prompt response. It will be highly appreciated at this time. We are not asking for any donations, but simply a remittance on your subscription account if due. We thank our friends for their generous patronage in the past, and by making the paper better, will merit it in the future.

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does away entirely with all starting and running batteries, their annoyance and expense. No belt—no switch—no batteries. Can be attached to any engine now using batteries. Fully guaranteed.
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IS THE STANDARD
STEAM PUMPS, AIR LIFTS,
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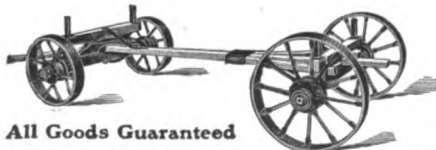
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If a fast-cutting steel is required, this is the best and most reliable of this grade. It will do more work than any other known steel, and every bar is uniform and free of the "Cracking" so generally a feature in steels of this grade.

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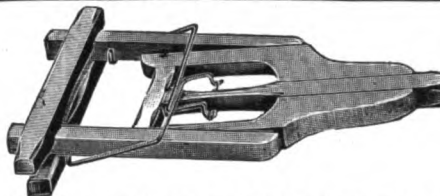
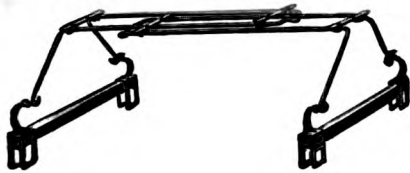
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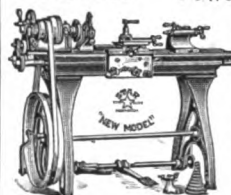
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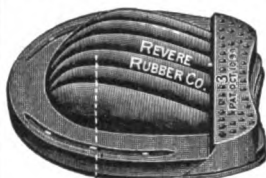


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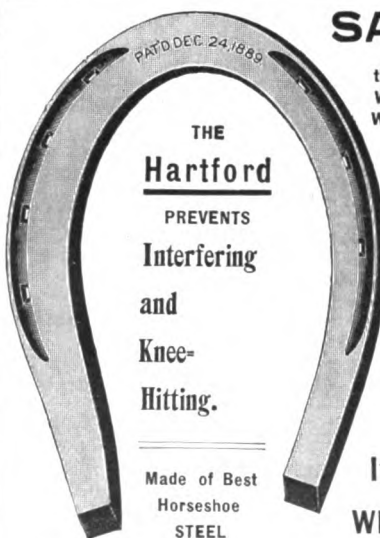
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For the Jobbing Trade.



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Interfering
and
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Made of Best
Horseshoe
STEEL

SAY:

Do you use
the best side
Weight and Toe
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Why Not?



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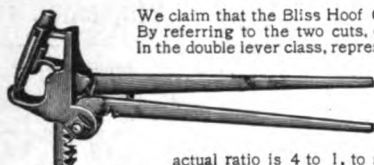
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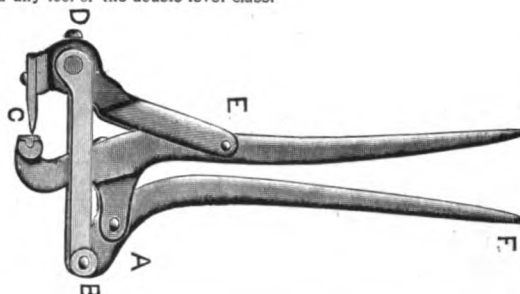
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Carries Weight of Tongue on Axle



PATENTED MAY 21, 1901.

and it's the only support that does.

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This Tongue Support Absolutely Unequaled

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H. C. BURK
BURLINGAME - KANSAS

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WE are now manufacturing only our new reinforced double Steel Neverbreak Shaft-Ends. We use only the best tempered steel and baking enamel, so that the finished shaft-end is remarkably free from either speck or tendency to chip or scale, making our device equal in finish to the best patent leather. Fillers are of hardwood. We guarantee every Shaft-End to be perfect in workmanship and material. They will fit any of the standard sizes of Buggy, Cart, or Surrey Shafts. Unlike all other shaft-ends, the Neverbreak can be adjusted to a broken shaft in less than five minutes; besides being a time-saving device they are also economical, being reversible, so that they can be adjusted to either right or left shaft.



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Sizes and
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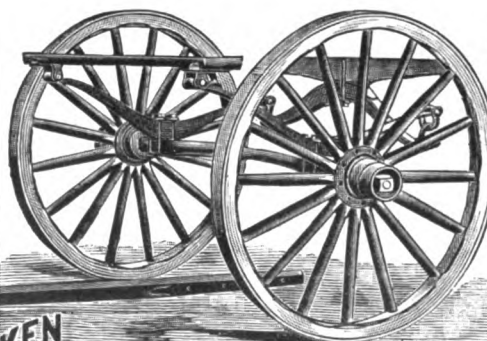
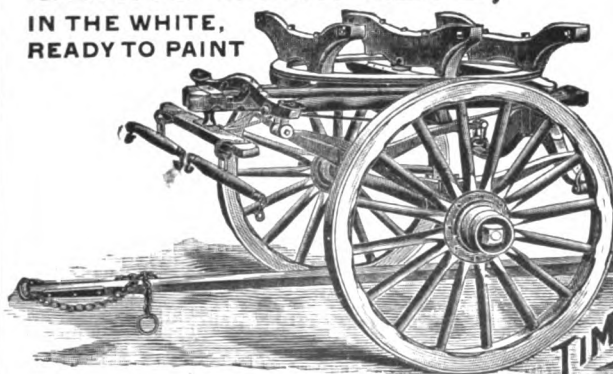


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Give us a TRIAL ORDER for a gross. This is a sure repeater.

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TIMKEN
ROLLER BEARING AXLES
REDUCE THE DRAFT 50%

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Good as New

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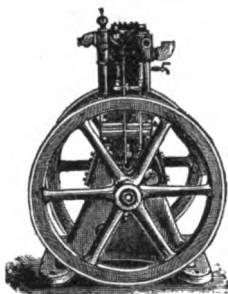
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216 LAKE STREET • CHICAGO, ILL.**OUR GAS and Gasoline ENGINES** Operate at the least possible expense and your blacksmith shop is not complete without one. It can be started in a moment, requires no attention after starting and will not affect your insurance. Our 3½ Vertical Straight Line Engine will be furnished complete, equipped for gas or gasoline, including hot tube igniter, starting crank, atomizer, gasoline tank, water tank, piping, and fully guaranteed.

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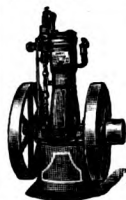
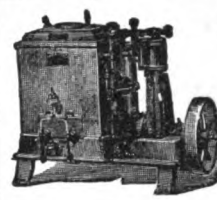
LAZIER GAS ENGINE CO.585-593 ELLICOTT SQUARE
BUFFALO, N. Y., U.S.A.**SIMPLICITY IS A FEATURE OF OUR ENGINES.**

Anyone can start and run them.

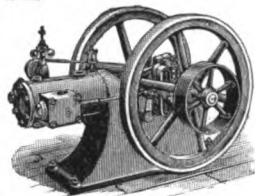
Superior Construction.

High Grade**Gas Engines****AT REASONABLE COST**

Agents wanted in unoccupied territory. Write for catalogue and prices. Mention the American Blacksmith.

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The safest, best and most efficient power for blacksmith and wagon shops. Refined or crude oil used. Be sure and get my prices and catalogue—free.

CHAS. W. PERCY
212 Summer St., Boston**AS NEARLY PERFECT AS CAN BE MADE** is what we claim for our **GAS AND GASOLINE ENGINES.**

These Engines are the result of twenty years' practical experience, and are unsurpassed for efficiency of operation and quality of workmanship.

OUR CATALOGUE WILL INTEREST YOU.**The FRANK M. WATKINS MFG. CO.** 357 Baymiller St.
CINCINNATI, O.**NO BLACKSMITH SHOP COMPLETE WITHOUT POWER.**

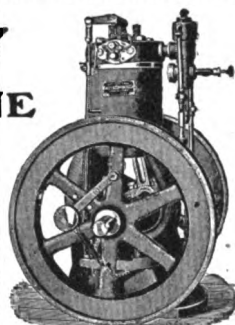
No Power so

HANDY

as a Good

GASOLINE ENGINE.

Let us send you our catalogue and quote prices. Our Specialty 1½, 2½ and 4 H.P. State your power needs. If you have a Steam Engine give full description. We sometimes make exchanges.

**BATES & EDMONDS MOTOR CO.,** - Lansing, Mich.

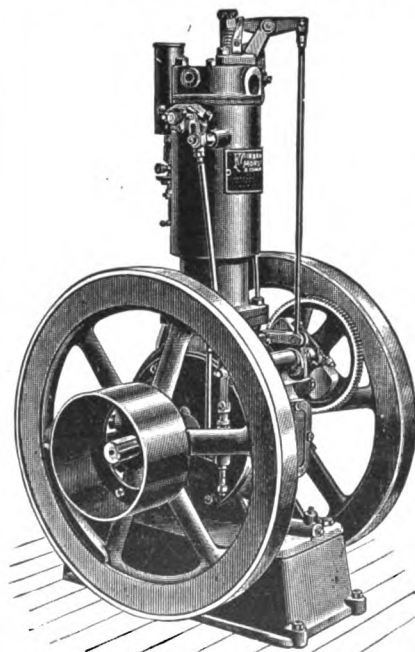
"THE BEST IS NONE TOO GOOD"

"GUS" GAS AND GASOLINE ENGINE

A MODEL OF PERFECTION

WRITE FOR CATALOG AND PRICES

THE CARL ANDERSON CO.
23-27 N. CLINTON ST. - CHICAGO.

FAIRBANKS-MORSE
Gas and Gasoline Engines**1½ to 54 HP.****Horizontal and Vertical****OUR VERTICAL ENGINES** Are Specially Adapted for Use in Blacksmith Shops.

Built in 1½, 2½ and 5 HP. Sizes.

SEND FOR CATALOGUE BL

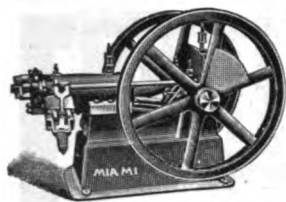
FAIRBANKS, MORSE & COMPANY

CHICAGO, ILL.

NEW YORK, N. Y.

BRANCH OFFICES IN ALL PRINCIPAL CITIES

SPECIAL Our new catalogue BL is full of interesting and useful information about gas and gasoline engines. Every blacksmith and wagon-builder should have one. Cheerfully sent upon application.



THE QUESTION OF FUEL ECONOMY IS A VERY SERIOUS ONE

It is a very easy thing for one engine to use from \$75 to \$300 more fuel per year, than one more correctly designed and built. OUR

MIAMI GAS AND GASOLINE ENGINES

represent the highest fuel economy and the longest life.

MIAMI ENGINES, HORIZONTAL, 5 TO 65 HORSE-POWER, 12 SIZES.
WOODPECKER ENGINES, HORIZONTAL, 2½ HORSEPOWER, SPECIAL.

The Middletown Machine Company, Middletown, Ohio.

WRITE FOR CATALOGUE AND NEAREST AGENT.

FOR SALE—10 x 18 DOUBLE CYLINDER OTTO GASOLINE ENGINE. Latest improvements, tank, piping and all attachments. First-class running condition. At less than half cost. Large stock second-hand laundry machinery, all guaranteed. Send for full list.

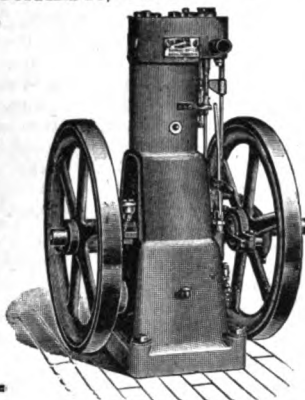
PARADOX MACHINERY CO.,
181 E. Division St.,
CHICAGO, ILL.

COLUMBUS GASOLINE ENGINES

ARE THE THINGS FOR BLACKSMITHS

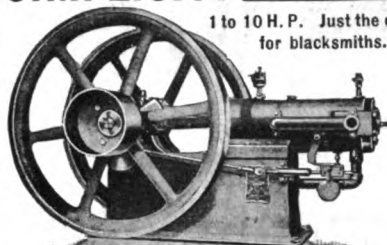
COLUMBUS MACHINE COMPANY
Columbus, Ohio.

Send
for
Catalogue
33
Stating
Horse
Power
You
Need.



SIMPLICITY is one of the fine points of the HARTIG ENGINE.

1 to 10 H. P. Just the engine for blacksmiths.

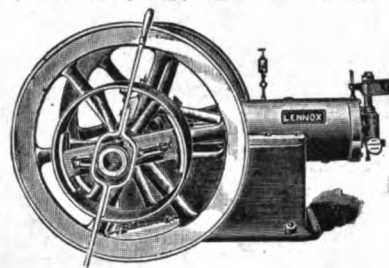


Unexcelled for economy and ease of handling. Prices and Catalogue free on application.

HARTIG STANDARD GAS ENGINE CO.
14 Commercial Street, Newark, N. J.

Lennox Machine Co.

Manufacturers of the Lennox Stationary Gas and Gasoline Engines for General Purposes



Complete Blacksmith Power Outfits. Shafting, Hangers, Pulleys, Belting and Emery Stands.

WRITE FOR ESTIMATES

LENNOX MACHINE COMPANY
101 9th Ave., MARSHALLTOWN, IOWA

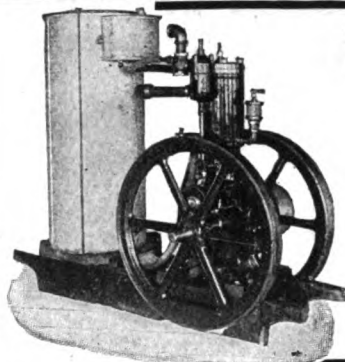
THE BLACKSMITH'S HELPER

Do You Need Power?

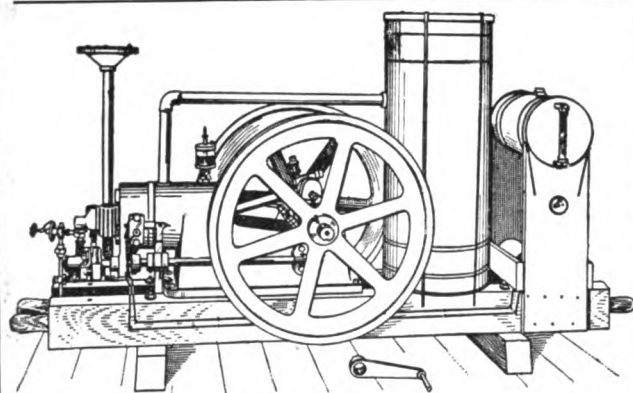
You want the most reliable engine for the least money. Let us show you. The Beebe Engine is the most simple and reliable power made. Been building them for 14 years. We ought to know. No experiment. We passed this stage years ago. Just a good, reliable engine that can always be depended on. Our prices will interest you.

Write for Catalogue.

The BELOIT GAS ENGINE WORKS
BELOIT, WIS.



Witte Gasoline Engines



WITTE JUNIOR ON SKIDS.

Witte Engines have been made by us for 14 years. That they are perfect is certain or we could not sell them today. Every improvement known to the trade is embodied in these engines and they are also reliable, economical and durable. Our works are equipped with all the best labor-saving machinery. Capacity, 1200 engines per year built in several types and

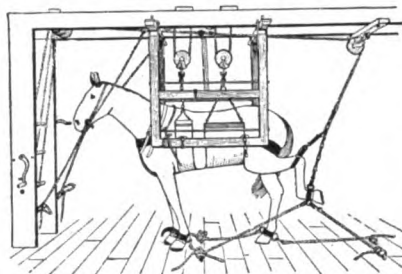
Sold at One Profit from Maker to User.

Send for Catalogue J. Free. Full of Information for the Gas Engine User.

Witte Gas and Gasoline Engine Company

WITTE IRON WORKS CO. 46 South Canal Street
612 W 5TH ST., CHICAGO, ILL.
KANSAS CITY, MO.

"It Fools the Mules"



You
Run
No
Risk...

of being killed or disabled in shoeing vicious horses
IF YOU USE

Martin's Horse Shoeing Rack

The perfect safeguard against danger and aid in shoeing wild and mean horses and mules.

This is the original patented rack; avoid imitations and infringements.

Read what U. H. Shadwell, Caldwell, Ohio, writes:

"Please send me one of your Racks at once. This will make three Martin Racks I have bought in eight years. The others as far as I know are as good as new. I have changed shops that often, and no shoer will, if he knows his business, allow a Martin Rack to leave his shop. I consider no shop complete without it. I have never failed to shoe any horse brought to my shop regardless of size; have also shod cattle, and consider it the best device for that purpose ever invented."

Descriptive matter and special price offer mailed on request.

MARTIN HORSE RACK,
Sidney, Ohio.

EXCELLENCE OF PRODUCT

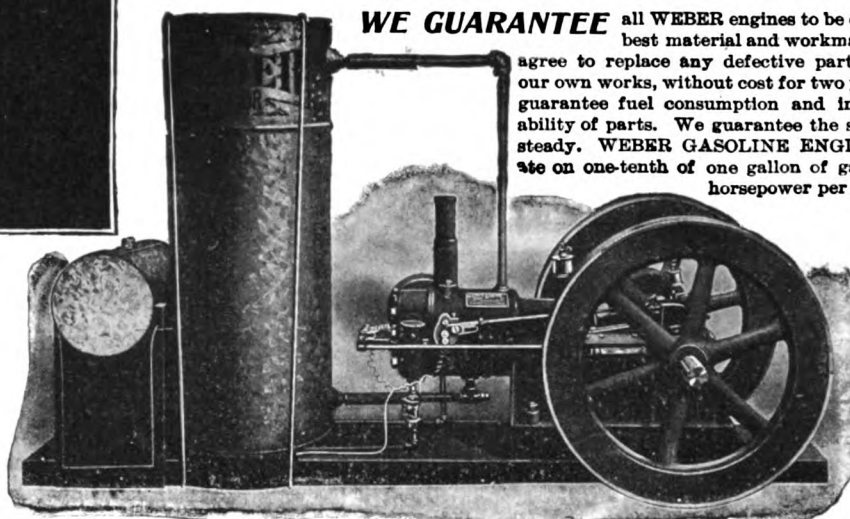


WEBER ENGINES

Are in use in EVERY State in the U. S. and in every foreign country.

7500 WEBER JUNIOR ENGINES
ARE IN USE IN ALL PARTS OF THE
WORLD GIVING SATISFACTION.

WE GUARANTEE all WEBER engines to be of the very best material and workmanship, and agree to replace any defective part, F. O. B., our own works, without cost for two years. We guarantee fuel consumption and interchangeability of parts. We guarantee the speed to be steady. WEBER GASOLINE ENGINES operate on one-tenth of one gallon of gasoline per horsepower per hour.



The 2 1/2-Horsepower WEBER JUNIOR as it appears at work.

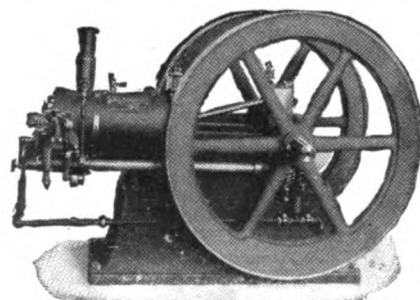
.. OUR NEW .. CATALOGUE

Just out—gives much interesting and valuable information about gas engines. Also over 100 endorsements of the WEBER from blacksmiths and others. It should be in the hands of every blacksmith, wood-worker and shop owner. FREE. Send postal for it.

The Junior is shipped (crated) with all fixtures attached ready to set up and run, requiring no pipe fitting or connections—it is HORIZONTAL not Vertical. A horizontal engine is stiffer, safer, stronger and will last longer than any vertical engine on earth.

5 H.P.

This is another Blacksmith specialty we are building that is proving most satisfactory. Has electric and tube igniters, gasoline pump, underground tank, sensitive governor and all latest improvements.



5 H. P. WEBER.

GUARANTEED ABSOLUTELY O. K.

EVERY ENGINE CRITICALLY TESTED BEFORE SHIPMENT.

Other sizes up to 300 H. P. in Engines and Hoists.

19 Years keeping everlastingly at it has developed the "Weber" to its high state of perfection.

PRICES owing to our exceptional facilities and the large quantities going through our factory, we are able to make the prices, like the engine **RIGHT**

Every Engine Sold is an Advertisement.

ADDRESS FOR PRINTED MATTER :

Every User of a WEBER is an Endorser.

Weber Gas and Gasoline Engine Co.

P. O. BOX, V 1114.

KANSAS CITY, MO.

Trade Literature and Notes.

The Lennox Machine Company, Marshalltown, Iowa, informs us that in addition to their horizontal gasoline engine of from four to twenty-five horsepower, they furnish a line of two and three horsepower engines suitable for blacksmith shops, pumping water, running separators, feed grinders, corn shellers, wood saws, etc. This firm also construct a rotary power shear, which will handle from $\frac{1}{4}$ to $\frac{1}{2}$ -inch material.

A 16-page booklet from Geo. Sears & Co., Clinton, Iowa, describes and illustrates the Sears Blacksmithing Device. "It is unequaled in efficiency, capacity and perfect working qualities," says the catalogue.

An 8-page circular describes the Bliss Hoof Cutter, recommended for its simplicity, durability and its property of escaping contact with the frog and making a perfectly level cut. Sent by the Bliss Manufacturing Company, South Egremont, Mass.

A handsome catalogue is that of Fairbanks, Morse and Company, Franklin and Monroe Streets, Chicago. Its 32 pages, with half-tone engravings, describe the Fairbanks-Morse engines for gasoline, naphtha distillate, kerosene and crude oil. A smaller booklet is devoted to the Fairbanks-Morse gasoline engines for farm work. Still another describes and illustrates the Fairbanks Power Hammer, the mitering and bevelling saw table and the Fairbanks saw-sharpening machine.

The American Well Works, Aurora, Ill., who have been occupied during the last two years in rebuilding their works, are now in a position to handle promptly their order for well sinking and pumping machinery for heavy work, air compressors, gasoline engines and the Chapman Patent Air Water Lift System.

The Rumsey-Williams Co., St. Johnsville, N. Y., issue a catalogue containing information of considerable interest to the gas engine user. This firm makes a line of stationary, portable and semi-portable engines, ranging from two to fifteen horse-

power and adapted to a large variety of uses, such as general power work, lighting, pumping, feed grinding, etc.

A 32-page catalogue, 18 B, of the Seneca Falls Mfg. Co., of Seneca Falls, N. Y., describes and illustrates the Star foot and power lathes, accessories and specialties manufactured by this company. A complete set of price lists is an added convenience to the intending purchaser.

Another attractive booklet from the same firm catalogues their full line of foot and hand power wood working machinery. The last page gives valuable advice on "The Best Way to Order."

A catalogue of unique design has just been issued by the Montross Metal Shingle Co., manufacturers of metal shingles and tiles, Camden, N. J. The designs in metal roofing and siding illustrated herein, are both handsome and interesting.

Queen City Wheel Co., Cincinnati, Ohio, send us their special net price list No. 1, calling special attention to their net prices on Sarven patent wheels with Queen City tires, and also their figures for re-rubbing old wheels.

The Standard Tire Setter Company, Keokuk, Iowa, have recently issued a novel advertisement in the edition of a newspaper termed "The Tire Setter News," which gives an interesting supplement, showing many views of the Henderson Hand Power Tire Setter, manufactured by this concern. An idea of the growth of their tire setter business is gained and many strong testimonials also printed.

A neat little twenty-four-page catalogue of the Brooks Cold Tire Setter Company of 118 North Wichita Street, Wichita, Kansas, is devoted to describing and illustrating the Brooks Cold Tire Setter as the "latest and best up-to-date machine for wagon and carriage shops."

Ashmead, Clark & Company Commercial Engraving

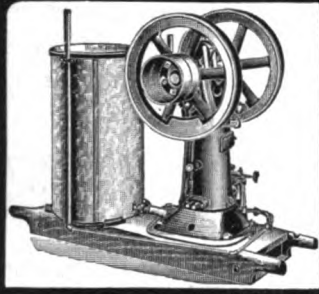
LETTER HEADS, STOCK CERTIFICATES,
BONDS, CHECKS, CATALOGUE
COVERS, CARDS

611-613 Chestnut St., PHILADELPHIA.

GAS ENGINES . . .

Will do anything any engine can do. Simple, durable and fully guaranteed. Furnish reliable power at the least cost for fuel. Perfectly safe. You are losing money every day you delay ordering. Our engines can be started and successfully run by anyone. We can save you money. Write today for our catalogue A.

CANFIELD GAS & GASOLINE ENGINE WORKS
Binghamton, N. Y.



The Many Purpose Power

On account of its compactness, simplicity and adaptability to so many purposes, the

Webster Vertical Gasoline Engine

is indispensable to repair shops, smiths and other artisans. Self-contained and complete as shown in cut. Easily carried by hand to any work to be done. Develops 3 full horse power at a cost of 3 cents per hour. Handiest, safest, most durable little power made, with no end to its uses. Handsome large card, printed in colors, showing this engine at work in shop, sent free on application. Write for price and catalogue fully illustrating this engine.

WEBSTER M'FG CO., 2013 WEST 15TH STREET, CHICAGO, ILL.

NO MONEY IN ADVANCE.

The "Success" Grinder

has the highest speed of any Foot Power Grinder and is the only one fitted with **CARBORUNDUM** wheels.

Is regularly equipped with two **Carborundum** wheels and complete **polishing outfit**, consisting of felt wheel coated for use, and cloth buffers with the necessary polishing compound. Same will be shipped to any part of the United States, east of the Rockies, on ten days' free trial. If satisfactory, remit us \$9. If machine is not satisfactory, return to us.

LUTHER MANUFACTURING CO.,
NORTH MILWAUKEE, WIS.

SPRAGUE'S FLY BOUNCER

Every blacksmith knows it is almost impossible to do a good job of horseshoeing during fly time, even with one or two helpers to hold the horse and try to keep the flies away, as no horse will stand still when bothered with these pests, and no horseshoer can do good work unless the horse stands still.



All blacksmiths welcome Fly Bouncer, for by spraying a very little of it around the doors and windows of the shop, no fly will enter the building. With no flies to bother him, the horse stands quietly to be shod. The blacksmith not only saves the expense of one or two helpers, but can turn out better work at a very little expense, as one gallon of Fly Bouncer will be sufficient to keep the flies out of a shop for two or three months. When once used it is always used during the fly season. Try it.

We make special low prices to blacksmiths for their own use. They can also make money by selling to liverymen, dairy men and others. Fly Bouncer is an easy seller, and big profit for agents. Write at once for circulars, testimonials, etc.

SPRAGUE COMMISSION CO. Address Nearest Office

218 So. Water St., Chicago, Ill.; 201 Front St. Portland, Ore.; 10 S. 4th Street, St. Joseph, Mo.; 27 Juneau Ave., Milwaukee, Wis.; 204 Market St., St. Louis, Mo.; 3404 University Ave., Minneapolis, Minn.; 615 Locust St., Des Moines, Iowa; 439 Cole Ave., Dallas, Texas.

26-28 Vesey Street, New York City.
206 E. Jefferson St., Louisville, Ky.
815 Sansome St., San Francisco, Cal.
444 St. Paul St., Montreal.



**RUBBER RUNABOUT, \$35.00
TIRED****TOP
BUGGY,
\$27.50****BUGGY
TOPS,
\$4.50**

Write for 100-page Catalogue. It's free. Compare Our Prices.
BUOB & SCHEU, Estab. 500-520 EAST COURT ST.
 1883 CINCINNATI, OHIO.

METAL SHINGLE ROOFING...

With Montross Telescope Side-Lock is the best roofing in the world for house or barn. Storm proof. Easily applied. Catalogue, Prices and Testimonials free for the asking.

Montross Metal Shingle Co., Camden, N. J.**"The Australasian Coachbuilder & Wheelwright."**

A Monthly Illustrated Technical Journal circulating amongst Coachbuilders, Wheelwrights and Blacksmiths throughout the Commonwealth of Australia, New Zealand and South Africa.

Advertising and subscription rates on application to

J. E. BISHOP & CO.,
 65 MARKET STREET,
 Sydney, Australia.

Good Tops Help Make Good Buggies

You can get good tops from

MEYER

and his
 Prices are the Lowest

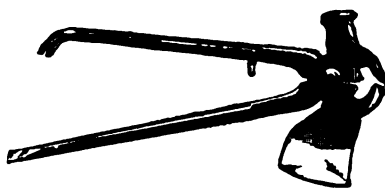
Send for our free catalogue and price list today. A complete line of tops and trimmings.

Write today—It will Pay

C. G. MEYER

Main and Ann Streets

TIFFIN, OHIO

Ranchman Combination Tool

DROP FORGED TOOL STEEL
 HATCHET, HAMMER, PINCERS,
 BELT or HARNESS PUNCH, CLAW
 WIRE CUTTER, SCREW DRIVER.
 EVERY FARMER AND DRIVER SHOULD OWN ONE.
 Retail Price \$1.00. Agents Wanted.
Automatic Specialty Co., Newark, N. J.

CUT SHOWS A**No. 5 Combined Punch and Shear**

with 12-in. throat for punching $\frac{1}{4}$ in., and a 12-in. blade for cutting No. 8 gauge metal. 2 x $\frac{3}{4}$ in. bars, $\frac{5}{8}$ in. round, weight 525 lbs. Made in 18 different sizes, from 240 to 2,200 lbs. We make a specialty of shears, punches and rolls. Tools for shearing, punching and bending sheet metal, bar iron and angle iron.

BERTSCH & CO.

CAMBRIDGE CITY, IND., U. S. A.

Hausauer, Son & Jones**PRINTERS, ENGRAVERS****BOOKMAKERS**

253-257 Ellicott Street, Buffalo, N. Y.

Complete Equipment for the production of Machinery Catalogues, Stock Farm Catalogues, College Annuals, also Catalogues in Foreign Languages, promptly, accurately and tastefully.



Bowman's Horse, Cough, Whooping and Indigestion Cure. A veterinary specific for wind, throat and stomach troubles. Strong recommendations. \$1 per can. Dealers, mail or R. paid. Bowman Horse Remedy Co. (S) Toledo, Ohio.



\$60. Back-gear screw cutting foot or power made in large lots with special tools; swing ten inches over bed. Our ten years of manufacturing, small lathes enables us to make a low price on a high grade tool. Write for guarantee, circulars and discount.

Carroll & Jamieson Machine Co.

BATAVIA, - - - OHIO.

The Crescent "Eveready" Plowshare

Extra Heavy and Smooth Upset Shin on all Plowshares.

**SAVES TIME, PATIENCE AND MATERIAL**

Can be fitted to plow easily, quickly. Are welded securely, point finished and fully ground and polished.

ORIGINATED AND MANUFACTURED BY

HAVANA METAL WHEEL CO., HAVANA, ILL., U. S. A.

Manufacture a full line of CRESCENT Steel Lister shares, Subsoilers, Cultivator Shovels, Landsides, Moldboards from Solid, Crucible and Genuine Soft Center Steels.

IF YOUR JOBBER DOES NOT HAVE THE CRESCENT WRITE US.**We are the Largest Manufacturers of Truck Wheels in all America.**

PROPRIETORS: WM. WILHELM, A. R. KOEHLER.

HALF TONE PROCESS

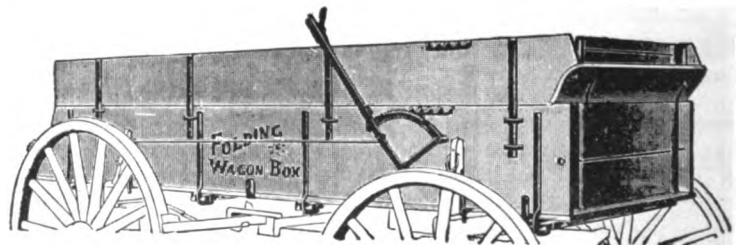
WOOD & FINE WAX ENGRAVING

ZINC ETCHING

ELECTROTYPING

Buffalo Electrotyping & Engraving Co.

GIVE US A TRIAL OUR FACILITIES ARE OF THE LARGEST

Do You Build Farm Wagons?**THEN YOU ARE INTERESTED in the FOLDING WAGON-BOX.**

Built in separable parts which firmly and tightly interlock, making a simple, practical, strong and durable farm wagon bed which a boy can handle—put it on or off the running gear—easily and quickly, any place. Easily and compactly stored in very small space when not in use. Its simplicity and convenience appeal to all classes of farmers. (See description in February AMERICAN BLACKSMITH.)

With the special irons any wagon-maker can build this knock-down box, right in his own shop, easily, quickly and cheaply, with the same wood-work as is used in the old-style box, of any pattern or dimensions to suit the trade.

PRICE OF IRONS \$1.75 PER SET; \$10 PER HALF DOZ. SETS. FREIGHT PREPAID ON DOZ. SET ORDERS.

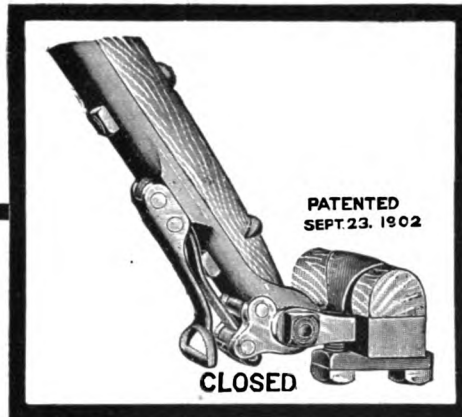
FOLDING WAGON BOX CO., Haverhill, O.

Convenient to put on Shafts

The NONE SUCH Coupler is made to put on the shafts with bolts and nuts. (See Cut.)

The NONE SUCH shaft ends can be bent to fit the wood to a curve of one-half inch in five inches and yet work perfectly.

Its convenience and adaptability is at once apparent.



NONE SUCH

THE NONE SUCH is a quick-shifting, anti-rattling Coupler, for use with the common axle shackle and bolt.

Shifting can be done in five seconds, even by a one-armed man, for ONE HAND is the only tool required.

It is absolutely safe. Shafts (or pole) cannot be detached from the wagon even if Coupler is unlatched, unless the POINTS OF SHAFTS (OR POLE) REST ON THE GROUND.

Send for further particulars and prices.

**E. C. Bradley
& Son
Syracuse, N. Y.**

Have You Seen the Very Latest?

The Latest and Best!

The problem of producing the greatest blast with the least work has been solved by the

LANCASTER No. 401 BLOWER

Has more improvements than any other blower on the market, and is acknowledged to be the best ever produced.

The height and angle can be easily adjusted to suit any forge.

The highest grade of material and workmanship is put into them.

All bearings and working part are enclosed in a dirt-proof casing.

The ball bearings and spiral gearing run in oil, and are practically frictionless.

Altogether the most quiet, steady and smooth running blower ever made.

We can't begin to tell you all the good points about this blower. Send for Catalogue, free, or ask your dealer about the Lancaster No. 401. . . .

Once a user, always a user.

Lancaster Forge & Blower Co.

BUFFALO, N. Y.



OUR Forges are up-to-date, having valuable features, found in no other forges. Built for heaviest work. Furnished with our new ball tuyere and improved fire pot with centre and side blast, still friction clutch and ring-oiling bearings.

THE NEW BLOWER—LANCASTER No. 401.

99

SPUR GEARS ARE GEARS ON PARALLEL AXES.

SPUR GEARS

99

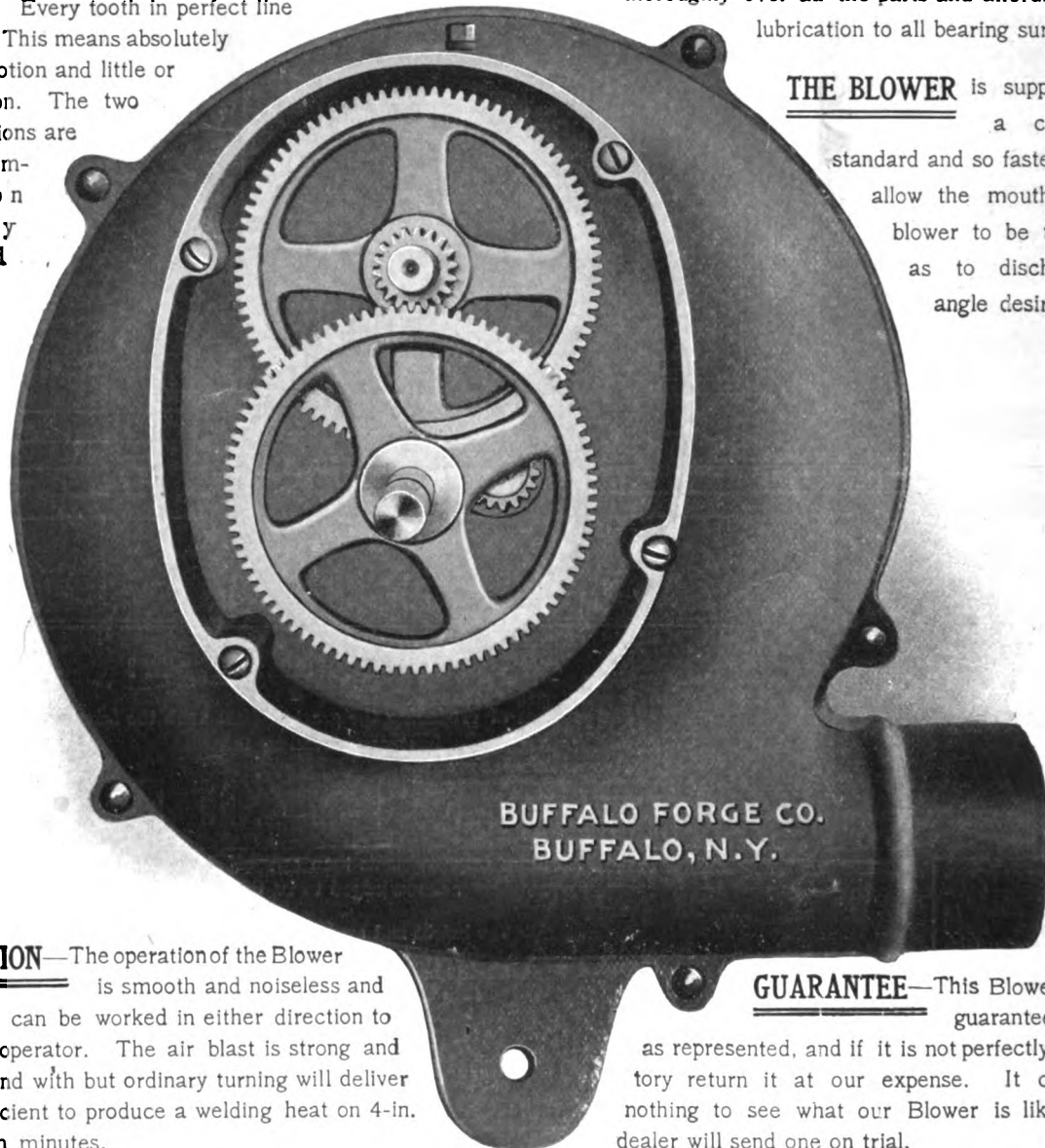
AS THEY OPERATE IN OUR No. 99 HAND BLOWER

SIMPLICITY—As shown by the illustration only four gears are used. This is a winning feature as there is no complicated machinery to get out of order.

THE GEARS—The two main gears are perfect castings, machine cut, accurate and true. Every tooth in perfect line contact. This means absolutely no lost motion and little or no friction. The two small pinions are special composition perfectly cut and adjusted.

LUBRICATION—The four gears are enclosed in a dust proof frame. The frame is made perfectly tight so that oil to the depth of one inch may be maintained at the bottom of the case. In this the lower gear wheel constantly revolves, throwing the oil thoroughly over all the parts and affording ample lubrication to all bearing surfaces.

THE BLOWER is supported on a cast iron standard and so fastened as to allow the mouth of the blower to be turned so as to discharge at angle desired.



OPERATION—The operation of the Blower is smooth and noiseless and the crank can be worked in either direction to suit the operator. The air blast is strong and uniform and with but ordinary turning will deliver blast sufficient to produce a welding heat on 4-in. iron in ten minutes.

GUARANTEE—This Blower is fully guaranteed to be as represented, and if it is not perfectly satisfactory return it at our expense. It costs you nothing to see what our Blower is like. Your dealer will send one on trial.

SEND NAME AND ADDRESS FOR LATEST CATALOGUE

99

BUFFALO FORGE COMPANY

BUFFALO, N. Y.

99

AMERICAN BLACKSMITH

BUFFALO
N.Y. U.S.A.

A PRACTICAL JOURNAL OF BLACKSMITHING

AUGUST, 1903

\$1.00 A YEAR
10¢ A COPY

The Brooks Tire Machine Co.

(INCORPORATED)

The Brooks Cold Tire Setter is the
Original Edge Grip Machine and is
IMPROVED RIGHT UP TO DATE.

We Lead and Others Follow.

**CAPITAL STOCK,
\$100,000.**

Why is it that there has been more
of these sold in the past two years
than any other two machines manu-
factured? First of all, because the

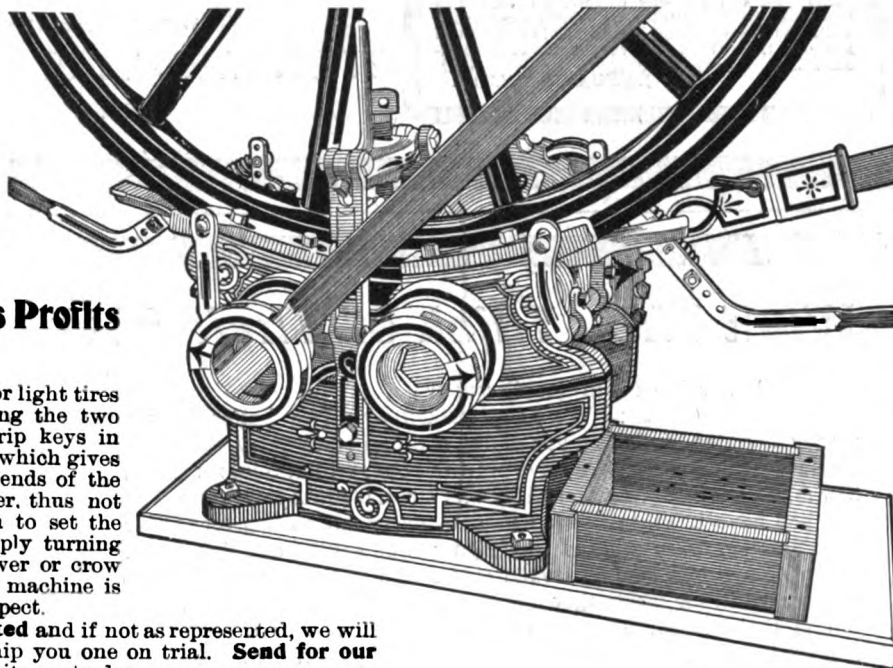
**WORK PLEASES
The BLACKSMITH'S
CUSTOMERS,**

and they advise their friends to take
their work to him, and

**His Business as well as his Profits
begin to Grow.**

It has two speeds and powers, one for light tires
and one for heavy tires. By pushing the two
short levers down, you force the grip keys in
against the tire with a tension spring which gives
additional pressure against the inner ends of the
keys, forcing them to operate together, thus not
having to use a hammer and punch to set the
keys. The machine is opened by simply turning
one eccentric. No prying with a lever or crow
bar to open the machine, in fact the machine is
mechanically constructed in every respect.

Shipped on trial and fully warranted and if not as represented, we will
pay the freight both ways. Let us ship you one on trial. **Send for our
terms and descriptive circular.** Write us to-day.



Azuza, California, July 23, 1902.
Brooks Tire Machine Co., Wichita, Kansas.

Gentlemen: Having had one of your No. 2 Cold Tire Setters in
use in my shop the past four months, we have set a great many tires
with it. The work was done to the entire satisfaction of our patrons.
I also find that the machine has been a great advertisement for the
shop, bringing work from quite a distance. In fact, we do not know
how we could run the shop without your machine, after having once
used it. It is the only machine that I have found that shrinks the
tire without compressing the whole wheel into a smaller circle, thus
saving the wheel from being crushed at every joint and putting an
unnecessary dish into the wheel. Wishing you success in your busi-
ness and thanking you for the truthful way in which you have repre-
sented your machine to me, I am Very truly,

R. M. SIPPLE.

Red Hook, N. Y., July 16, 1902.

Brooks Tire Machine Co., Wichita, Kansas.

Dear Sirs: In reference to my opinion of your Tire Machine, will
say I had meant to answer earlier, but have been rushed with work
and it was deferred from day to day. Another reason was, I wanted
to be fully satisfied by trying all kinds of tires before committing
myself, and now I can say for the Brooks Tire Machine, that I think
it the best machine on the market and does all you claim for it and
very quickly. I can set a tire with it better than any other way. I
have between \$2,000 and \$3,000 worth of machines in my shops, and I
would rather part with any of them than with my Tire Setter.

Wishing you success, I remain, yours truly,

GEO. W. STORMES.

The Brooks Tire Machine Company

121 North Wichita Street,

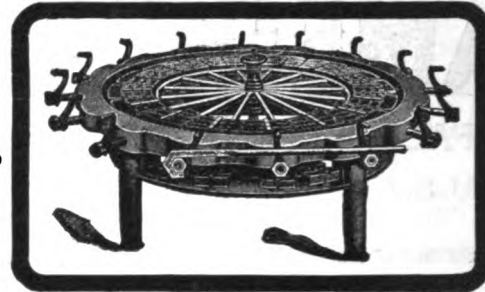
WICHITA, KANSAS.

It Sets them Cold by Hand.

The Vehicle Repairer's Best Friend Is the

Henderson ^{Hand} ^{Power} Tire Setter

Because it Sets Tires Cold, Keeps the Dish Just Right
and Tightens all Joints in a Wheel.



*The Greatest Labor-Saving and Money-Making
Machine ever Offered Blacksmiths and Wagon Men.*

Made \$32 in One Day.

STAPLES, TEXAS, NOV. 19, 1901.
Gentlemen: The machine has done all and more than you claim it to do. It has been a money-maker for us. Has increased our trade and gave our customers perfect satisfaction. We could not do business without it. It is a great thing over the old way of setting tires; it has more than paid for itself. One day we made \$32 with the machine and I think it is one of the grandest things that was ever invented for blacksmithing. Respectfully,
LAWMAN & WILSON.

You don't have to remove any bolts or worry about the dish.

No complicated parts to get out of order. A thousand users endorse the Henderson.

The machine will draw trade, give you control of the tire setting business in your neighborhood, and **MAKE MONEY FOR YOU.**

Write for descriptive circulars and prices

STANDARD TIRE SETTER COMPANY

KEOKUK, IOWA, U. S. A.

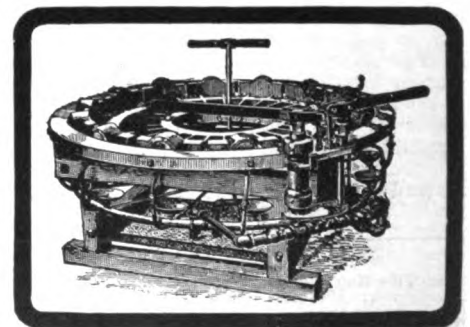
What They Think of Their "West" Tire Setter

TO THE WEST TIRE SETTER COMPANY.

NEW BEDFORD, MASS., April 15, 1903.

GENTS:—We have worked your Tire Setter for six years, and it has given us good interest on money invested, and has given entire satisfaction to every one of our customers, as it worked good on every job we have done with it. We have set tires 6 in. x 1 in., 5 in. x 1 ¼ in., 5 ½ in. x 1 in., steel tires and all smaller sizes, the first year, and which are, and have been, in use up to date every day carting rocks over good and bad roads without any sign yet of getting or being loose. We have set tires also on invalid chairs with ¾-in. round spoke, the wheels just fitting inside the ends of rams and did a very nice, good job, to the disappointment of eight spectators, who were present to see the little wheels get smashed by the big powerful machine, but "nit," as the machine has in all those six years NEVER hurt a spoke, rim or hub in any way.

The time we bought this machine we looked at the sum of money it cost as enormous (you know we have very few millionaire blacksmiths) but after sixteen months we had principal, interest and expenses back again, which is not found in every investment, besides saving a good many drops of sweat by not having to work so hard as the old way, let alone the time we saved. We don't advertise this machine in newspapers and other places, but let the machine do it by better work and less time, which counts for our customers as well.



CAUTION.

On March 31, 1903, The West Tire Setter Company filed a bill in the United States Circuit Court, Southern District of Iowa, against the National Machine Company, of Keokuk, for infringement of the West patents. USERS of infringing machines are warned that they are equally liable with the manufacturers.

If anyone in our section should want to see the machine work, or wants any information about it, you are at liberty to refer same to us, as we are willing to help them; we are ready and willing to live and let live. Yours,

FICHTENMAYER & FLYNN.

The West Tire Setter Co.
ROCHESTER, N. Y.

JUST What I HAVE BEEN LOOK-
ING FOR. I am going to
send for one RIGHT AWAY



Unequaled for leveling the back side of wagon spokes
in repair work.
PRICE, \$5.00. Write for discounts and circular.
W. H. EXLEY, PALMYRA, NEBRASKA

Ashmead, Clark & Company
Commercial Engraving
LETTER HEADS, STOCK CERTIFICATES,
BONDS, CHECKS, CATALOGUE
COVERS, CARDS
611-613 Chestnut St., PHILADELPHIA.



**\$12⁸⁵ Roll Top
DESK**
Solid Oak. We
sell these Desks 20% to 30%
less than all other makers.
Send for catalogue.
E. P. BLAKE COM'Y,
Boston, Mass.

Hotel Goetz
EUROPEAN PLAN

German Restaurant
For Ladies and Gentlemen

GOETZ, LAPORT & MANKE

194 Pearl St. and 35 W. Eagle St.
ONE BLOCK FROM MAIN ST.

**You Can't Fail. "REX" The King of High
Speed Steels**

Is sure fire every time. The way it walks off with locomotive tires astonishes
the natives. That isn't all it does, either.

*The mode of working is simple.
Let us send you the instructions.*

CRUCIBLE STEEL COMPANY OF AMERICA,
PITTSBURGH, PA.
Branches in 28
American Cities.

**WE ARE TRYING TO MAKE
AN IMPRESSION THAT IS**
We wish to IMPRESS YOU regarding three good books which we are selling

THE PRACTICAL GAS ENGINEER

By E. W. LONGNECKER, M. D. A manual for the Gas and Gasoline Engine owner. Tells
how to erect, operate and care for engines. Third edition. Price \$1.00.

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illustrated and bound in cloth. Price \$2.50.

Any of the above books sent on receipt of price, postage prepaid

AMERICAN BLACKSMITH COMPANY
P. O. DRAWER 974. BUFFALO, N. Y.

THE
**MANSION
HOUSE.**

COR. MAIN AND EXCHANGE
STREETS,
BUFFALO, NEW YORK.

\$2.00 Per Day and
Upwards.

DOES THE
BEST WORK
EASIEST KEPT
IN ORDER

It is the most Powerful



Does the
Largest
Range
of Work

SOLD BY

Bliss Manufacturing Co.
SOUTH EGREMONT, MASS.

EXPORT AGENT:
J. G. ROLLINS
NEW YORK
AND 124 HOLBORN
LONDON, E. C.

FOUND AT LAST.

**Raithel's Giant
Spoke Puller**

PATENT APPLIED FOR.



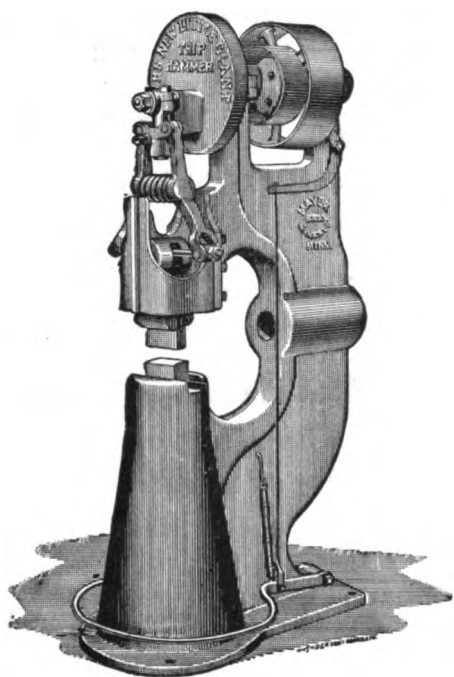
Guaranteed to pull any spokes from 3/4 to 3
inches out of any hub in a few seconds.

Satisfaction guaranteed.

Send for descriptive circular and price list.

GEO. RAITHEL,

Inventor and Manufacturer MIDDLEVILLE, N. Y.



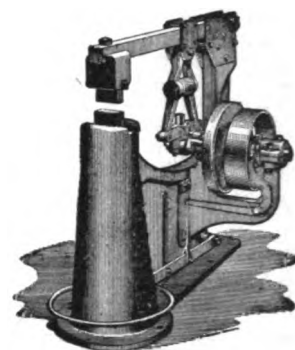
THE NEW LITTLE GIANT
U. S. PATENT, JANUARY 1, 1901
CANADA PATENT, AUGUST 20, 1901

550 NOW IN USE

TRIP HAMMERS

NOW IS THE TIME TO BUY

A TRIP-HAMMER
Is the Blacksmith's
BEST HELPER
And Will Pay for Itself
IN ONE YEAR



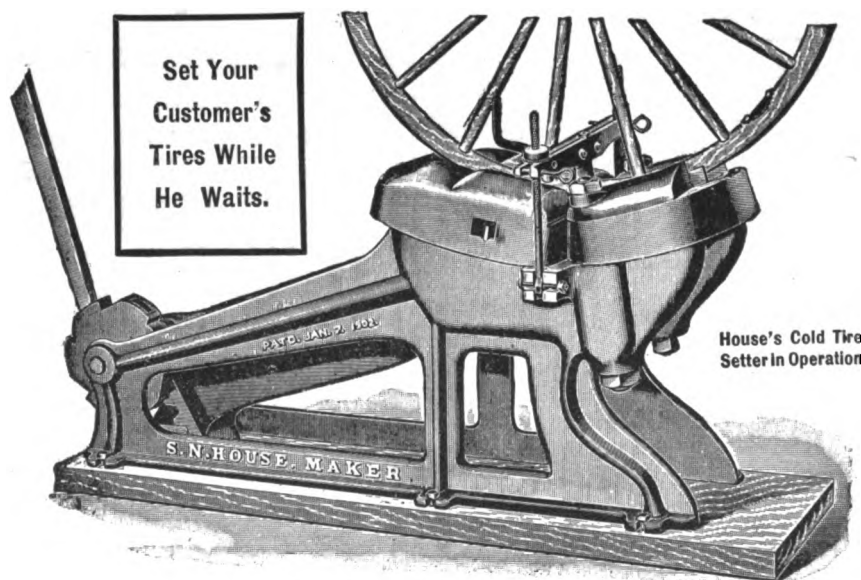
THE EASY
PATENT APPLIED FOR

50 NOW SOLD

For Prices and Information
Write to
MAYER BROS.
MANKATO
MINN.

MENTION
THE AMERICAN
BLACKSMITH

THE HOUSE COLD TIRE SETTER



House's Cold Tire
Setter in Operation

ONE MAN Can Set
Four Tires
In Twenty Minutes.

NOT NECESSARY TO REMOVE
THE TIRES OR THE BOLTS

It Does Not Crush or Injure
the Wheel.

You cannot afford to lose an hour taking off a tire and setting it the old way, for you can do it better with this machine in five minutes and save your fuel and bolts. It does not injure the tire nor woodwork, for it simply grips the tire on the edges in two places close together and shrinks it in a two or three-inch space, cold, just as we have been doing for years after they had been taken off and heated.

The grip keys are eight inches long, so they cannot scar nor cup the tire. The wheel is screwed down firm against the machine so that the tire cannot kink while setting. It sets them quickly and nicely, and it is the only machine that does. It is as simple and easily operated as the hot tire setters, made on the same principle, and will last forever. It is made of steel and cannot be broken; it weighs seven hundred pounds. Write at once for descriptive circular and price, which is very reasonable.

Will ship on trial. It is manufactured by

S. N. HOUSE, St. Louis, Mo.

**MacGowan & Finigan Foundry
and Machine Co.**

SELLING AGENTS,

41, 42 AND 43
GAY BUILDING ST. LOUIS, MO.

**SOLD ON TRIAL. 9 9 9 GUARANTEED TO DO EXACTLY AS
REPRESENTED OR NO SALE AND WE LOSE THE FREIGHT.**

ARE YOU BUSY?

WELL ANYWAY, here is a splendid opportunity to fill in your spare moments pleasantly and profitably. We are offering an inducement for you to call upon one of your friends or neighbor smiths and obtain his subscription for THE AMERICAN BLACKSMITH. This you can do very easily as the paper practically sells on sight. We will repay you for your efforts as follows : : : :



This accurate Bench Level given free for one new subscription. A very handy tool to have in the shop.

SEND US THE NAME

and address of one new subscriber together with \$1.00 and we will give you free, charges prepaid, either a good Bench Level or a Farrier's Hoof Knife. The subscriber gets the journal—you get the premium : : : : : : : : :

LOOK OVER OUR PREMIUM LIST

FOR ONE NEW SUBSCRIBER, we give you
A reliable 8½-inch pocket bench level, or
A good farrier's hoof knife.

FOR TWO NEW SUBSCRIBERS, we give
A fine gold fountain pen,
A 2-foot steel blacksmith's rule, or
A 16-inch crucible steel horseshoer's rasp.

FOR THREE NEW SUBSCRIBERS
An 8-inch steel hack saw complete with blade.

FOR FIVE
A graduated tire measuring wheel,
A 26 x 84-inch blacksmith's apron, or
An Ingersoll Yankee watch.

FOR EIGHT
A Giant Hoof Parer.

FOR TWELVE
A set of Little Giant screw plates in neat wooden case.

SPECIAL : As an inducement for men of the craft to try THE AMERICAN BLACKSMITH we will send each subscriber a copy of "The Village Smithy" free of charge. This is a handsome reproduction in colors, with canvas finish, of a beautiful picture painted expressly for us by Raphael Beck. A master-piece of art.



This Farrier's Hoof Knife is yours for one new subscription. The tool is made of special refined crucible steel, carefully tempered.

No premiums given for renewal subscriptions. Remit by Money Order, Express Order, Registered Letter or Stamps. Do not send Checks.

AMERICAN BLACKSMITH COMPANY

PREMIUM DEPARTMENT P. O. DRAWER 974 BUFFALO, N.Y., U. S. A.

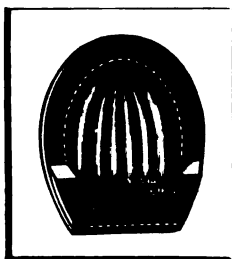
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THE MOST IMPROVED RUBBER PAD
OF ITS KIND.

ORDER BY NAME "A. C." THROUGH YOUR
SUPPLY HOUSE.

Consolidated Hoof Pad Co.

18 VESEY STREET, N. Y.

NOW IS THE TIME....

to start a movement for better prices in your county. With the present high cost of stock and increased living expenses, blacksmiths, horseshoers and wheelwrights should be getting better pay for their work. Co-operate with your brother craftsmen, and form an association for better prices in your county. Wake up your neighbor smiths. Send for our plans for forming County Associations. Read the Association articles in each issue of THE AMERICAN BLACKSMITH. See page 211.

Are you in favor of a State Lien Law for protecting the labor of blacksmiths, horseshoers and wheelwrights from bad debts? Fill out and send in the blank below. Send also the names and addresses of every smith in your county, so we can get them interested.

American Association of Blacksmiths, Horseshoers & Wheelwrights,

P. O. Drawer 974, Buffalo, N. Y.

I am in favor of a County Association for higher prices and will lend my support.

I also favor a State Lien Law.

Please send me your plans of forming local County Associations. I send a list of smiths in my county.

Name and Address

Town County State

ESTABLISHED 1836

BEALS & CO.

Iron, Steel and Hardware

Tools and Supplies for Horseshoers
and General Blacksmiths
Carriage Hardware and Woodwork

44, 46, 48, 50 TERRACE, BUFFALO, N. Y.

NO MONEY IN ADVANCE.



The "Success" Grinder

has the highest speed of any Foot Power Grinder and is the only one fitted with CARBORUNDUM wheels. Is regularly equipped with two Carborundum wheels and complete polishing outfit, consisting of felt wheel coated for use, and cloth buffers with the necessary polishing compound. Same will be shipped to any part of the United States, east of the Rockies, on ten days' free trial. If satisfactory, remit us \$9. If machine is not satisfactory, return to us.

LUTHER MANUFACTURING CO.,
NORTH MILWAUKEE, WIS.



HIGH-CLASS TOOLS OF NEARLY EVERY MAKE
ARE SHOWN IN
"The Tool Catalogue"
JUST PUBLISHED

704 Pages, and a Discount Sheet, sent to any address for 25 Cents
This is the book to have if you want to buy Tools right and keep posted as "to what is doing."

MONTGOMERY & CO.

Makers and Venders of High Grade Tools and Supplies

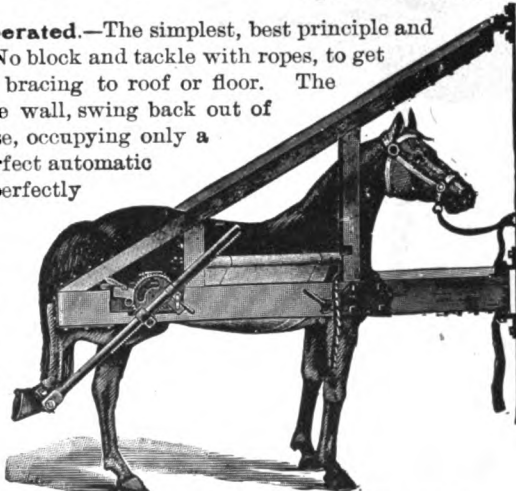
103 FULTON STREET

NEW YORK CITY

BARCUS HORSE STOCKS

The Most Easily Operated.—The simplest, best principle and perfect in every detail. No block and tackle with ropes, to get tangled and break. No bracing to roof or floor. The frames being hinged to the wall, swing back out of the way when not in use, occupying only a few inches of space. A perfect automatic device to hold the foot perfectly solid in any position desired. Guaranteed not to skin or chafe the foot. **Not the Cheapest but the BEST.** Correspondence solicited.

GEO. BARCUS
& COMPANY,
RENSSELAER, IND., U. S. A.



Canadian Horse Stock Co., Hamilton, Ontario, Canada.



SPECIAL NOTICE.

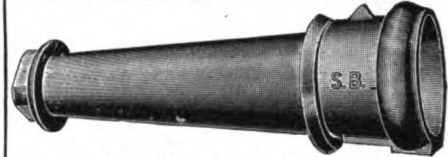
The American Blacksmith presents free to every person subscribing before Sept. 1, a handsome reproduction in twelve colors of "The Village Smithy," painted expressly for The American Blacksmith, by Raphael Beck.

Send a dollar now for a year's subscription with a copy of the picture. The edition is not endless. As a special inducement for new subscribers, those who send their order during August will receive as a premium, either a Handy Bench Level, or a Farrier's Hoof Knife, in addition to the picture. Send your subscription now before the matter slips your mind.

AMERICAN BLACKSMITH CO., BUFFALO, N. Y.

Newton's Heave, Cough, Distemper and Indigestion Cure. A veterinary specific for wind, throat and stomach troubles. Strong recommends, \$1 per can. Dealers, mail or Ex. paid. Newton Horse Remedy Co., Toledo, Ohio.

STUDEBAKER



S. B. TRADE CAST SKEINS

STANDARD PRICE LIST

NO.	SIZE.	PER SET.
1-2	x 6 inches	\$3.25
2-2	x 6 1/2 "	3.25
3-2 1/2	x 6 1/2 "	3.50
4-2 1/2	x 7 "	3.75
5-2 1/2	x 7 1/2 "	4.00
6-2 1/2	x 7 1/2 "	4.00
7-2 1/2	x 7 1/2 "	4.00
8-2 1/2	x 7 1/2 "	4.50
9-2 1/2	x 8 "	4.75
10-2 1/2	x 8 "	5.25
11-2 1/2	x 8 1/2 "	5.40
12-2 1/2	x 9 "	6.00
13-3	x 9 "	6.00
14-3	x 10 "	6.50
15-3 1/2	x 9 "	7.00
16-3 1/2	x 10 "	7.50
17-3 1/2	x 11 "	7.75
18-3 1/2	x 10 "	8.00
19-3 1/2	x 11 "	8.30
20-3 1/2	x 12 "	8.80
21-3 1/2	x 11 "	9.00
22-3 1/2	x 12 "	9.40
23-4	x 12 "	10.60
24-4 1/2	x 12 "	15.00
24 1/2-4 1/2	x 12 "	18.00
25-4 1/2	x 13 "	20.00
26-5	x 14 "	25.00

All sizes from 2 1/2 x 7 to 4 x 12 inclusive, are furnished with truss attachment, as shown in cut.

WRITE FOR TRADE DISCOUNTS

Studebaker Bros. Mfg. Co.
SOUTH BEND, IND.

DO YOU KNOW
"SURE CURE" is a standard, unfailing remedy for Quittors, Old Sores, Cuts, etc.
PRICE, \$1.00 PER BOTTLE.
4923 Cottage Grove Ave.
Prof. John D. Fitzgerald, CHICAGO, ILL.

HORSEMEN, USE DR. TURNBULL'S

CURINE The Great

American Veterinary Remedy



Formulated by W. A. W. Turnbull, V. M. D., late House Surgeon, Veterinary Hospital University of Pennsylvania.

A SAFE and POSITIVE CURE for Spavin, Splints, Curbs, Ringbone, Bony Growths, Rheumatism

Sprung Knees, Lameness of all kinds, etc.

It is the most Powerful Paint known, and SUPESEDES ALL CAUTERY or FIRING
NO BLEMISH! NO HAIR GONE!

Its effects are ABSORBENT, ALTERNATIVE, PENETRATIVE and ANTISEPTIC and it will reach the deepest seated trouble. We will WAGER \$500 a bottle of CURINE will produce better results than any paint, liniment or spavin cure ever made, and we will give \$100.00 for any curable case that it will not cure if used as directed. Every bottle is WARRANTED to GIVE SATISFACTION! Testimonials from the best horsemen in the world. Sold by druggists and harness dealers, or expressed from the manufacturers.

H. S. BOSSART & CO.,

Price { Large Bottles, \$2.00. 305-306 Arnold Bld.
Small Bottles, \$1.00. PITTSBURG, PA.

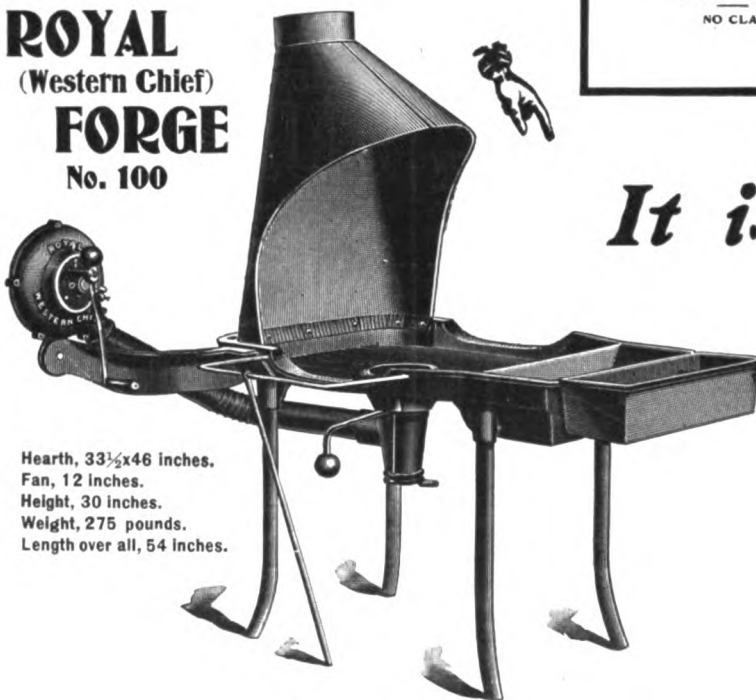
Send for our 96 page Little Giant, up-to-date book on the principal diseases of the horse, causes, symptoms and treatment, with testimonials and directions for CURINE. By mail free.

ROYAL

WESTERN CHIEF

ROYAL
In Every
Sense

ROYAL
(Western Chief)
FORGE
No. 100



Hearth, 33½x46 inches.
Fan, 12 inches.
Height, 30 inches.
Weight, 275 pounds.
Length over all, 54 inches.

MADE BY

Canedy-Otto Mfg. Co.
CHICAGO HEIGHTS, ILL.

SOLD BY

First-Class Dealers
EVERYWHERE

Reliable
Our Choice
Your Choice
America's Choice
Leads Them All



The
ROYAL FIRE POT
NO CLAY

HANDSOMEST: Because its constructive design is symmetrical, attractive and beautiful.
SIMPLEST: Because fan case and column stand (3 parts only) is about all there is of it.
BEST: Because made of the best material, by the best workmen and best mechanical experience that can be obtained.

SUPERIOR POINTS.

No Belts, no Clutches, no Ratchets.
The blower case oscillates on its bearing, permitting nose of case to point down or out or up, as may be desired; meeting any angle of blow pipe, thereby saving one elbow and 10 per cent. of blast force; besides valuable room occupied by other blowers.
The crank turns forward or backward, as suits the operator.
The gears are Phosphor Bronze and Steel, cut on the most scientific principle; they are flat, and straight cut (no spiral or worm gears); which combined with Steel Shafts and Composition Bearings made and assembled perfectly, run noiseless, and make this the best blower in the world.
The Gear Case is oil tight and dust proof, permitting gears to run in a bath of oil.
The Blast is very powerful, and as positive and steady as a power blower, and takes less labor to operate than others. The after blast is strong and lasting.
The Column Stand and Iron Base give a solid, non-trembling foundation.
The room it takes is less than any other blower.

*It is the way
they are
built that
pleases so*

A Mid-Summer Offer

A BUFFALO 99 GEARED HAND BLOWER

will be placed in your shop for free trial upon request to your dealer, absolutely without cost to you. Try one and see how you like it. Return if not satisfactory. Try it on your heaviest work. Try it on your lightest work.

Simple !
Compact !
Durable !
Efficient !



THE BLOWER

is supported on a cast iron standard, the mouth of the blower may be turned so as to discharge at angle desired.

LUBRICATION

The four gears are enclosed in a dust-proof case. Oil to the depth of one inch may be kept at the bottom of it. In this the lower gear wheel constantly revolves, throwing the oil over the parts and giving ample lubrication to all bearing surfaces.

OPERATION

The operation of the blower is smooth and noiseless. The crank can be worked in either direction to suit the operator. The air blast is strong and uniform and with but ordinary turning will deliver blast sufficient to produce a welding heat on 4-in. iron in ten minutes.

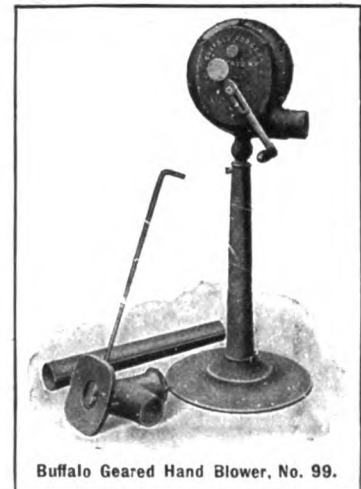
BUFFALO FORGE COMPANY
BUFFALO, N. Y.

SIMPLICITY

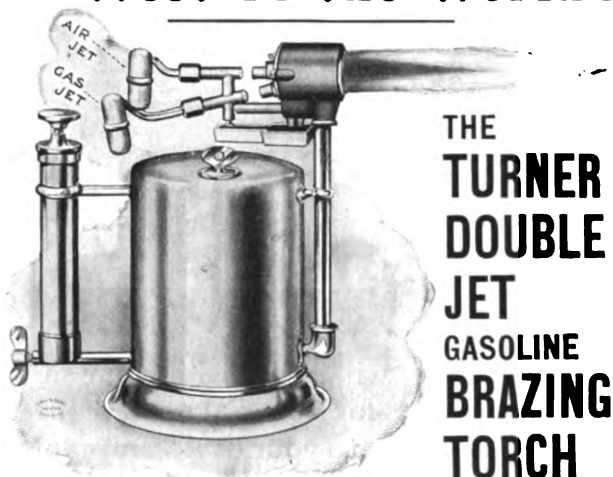
Only four gears are used. No complicated machinery to get out of order.

THE GEARS

The two main gears are machine cut. Absolutely no lost motion and little or no friction. The two small pinions are of special composition, perfectly cut and adjusted.



Hottest in the World!



THE
TURNER
DOUBLE
JET
GASOLINE
BRAZING
TORCH

Is over 1,000 degrees hotter than any other gasoline torch on the market and is unexcelled for

BRAZING, TEMPERING, DRAWING TEMPER, ANNEALING, FUSING, SOLDERING
and all other work requiring heat.

THERE IS NOTHING BETTER FOR BRAZING
RETAINING WIRES IN SOLID RUBBER TIRES

WRITE FOR INFORMATION AND CATALOGUE

The Turner Brass Works

63 NORTH FRANKLIN ST., CHICAGO



We Make Good Wheels

ARE

We fill Orders
at once
from Stock.

YOU

Special Price
on
Rubber Tires.

WITH

US?

REX BUGGY COMPANY

CONNERSVILLE, IND.

LIGHT Vehicle Wheels

as manufactured by us are held up for the world's
criticism. We make ALL KINDS, painted ANY
& & COLOR, or, IN THE WHITE. & &

THE PRICE WHICH WE MAKE ON RUBBER TIRED WHEELS IS BOUND TO
INTEREST YOU

We make a SPECIAL WHEEL, tired with $\frac{3}{4}$ -in.,
 $\frac{1}{2}$ -in., and 1-in. Steel Tire that is a winner.

.. WRITE US ..

Carriage Wheel Supply Co.

UNION CITY - INDIANA



\$5.50 CASH with Order or C. O. D.
FULL LINE OF CARRIAGE TRIMMINGS AT LOWEST PRICES
RACINE BUGGY TOP COMPANY
RACINE, WIS.

GEARS \$4.50 to \$180.00
Akron Wagon Gears are sold in every State in the U. S., and are the best that time and skill can produce.
800 to 20,000 lbs.
AKRON GEAR COMPANY, Akron, O.



BOLT CLIPPERS.
CHAMBERS BROS. CO.,
N. FIFTY-SECOND STREET,
PHILADELPHIA, PA.
EACH ONE GUARANTEED.

THE CHAMPION BLACKSMITH TONGS
One set of these tongs will take the place of three dozen ordinary tongs. They will adjust instantly for $\frac{3}{4}$ to 1 $\frac{1}{2}$ -in. iron with a firm and parallel grip. Handles remain apart same distance on all sizes of iron. Price \$2.50 per set of three tongs.
CIRCULARS
ON APPLICATION.



Queen City Metal Pattern Works 8 LOCK STREET, BUFFALO, N. Y.

The Best Flux known for Welding



Cherry Heat
Sole Manufacturer
The Welding Compound Co.
PATERSON, N. J.
Only firm in this line awarded DIPLOMAS and GOLD MEDALS at CHICAGO EXPOSITION, 1893, and OMAHA EXPOSITION, 1896.

And MALLEABLE Iron to Steel.
SEND FOR SAMPLES (NO CHARGE),
CIRCULARS, PRICE LIST, AND NAME
OF NEAREST DEALER

Climax Welding Compound
Welds all kinds of Steel as easily as Iron
Sample Free
For sale by dealers in Blacksmith's Supplies.
Manufactured only by
CORTLAND WELDING COMPOUND CO.
CORTLAND, N. Y.



THE OLD RELIABLE
THE BLACKSMITH'S FRIEND
The No. 3 A, for welding axles, springs, steel tire and all kinds of welding—medium fine grain.
The No. 4, Banner Borax Substitute; sixty-five per cent. saving over Borax. Leaves smoother surface and a better weld for tools, scissors, etc. Does not loose off in the fire like Borax, fine powder.
The No. 5, for heavy, coarse welding, to be used in the manufacture of anvils, etc.—coarse grain.
The No. 6 never fail toe-calk welding compound, the best for this purpose and general horseshoeing work—fine grain.
The Banner Welding Compound welds tool steel to common iron or tool steel to malleable iron very readily at a low heat. Guaranteed the best welding compound made or money refunded.
On receipt of \$2.00 from any blacksmith who has never used our compound we will ship 20 lbs. of any of the above numbers and make them a present of a fine leather apron to introduce our goods to the blacksmith. The apron alone is worth \$1.50.
SOLE MANUFACTURERS
THE CORTLAND SPECIALTY CO. CORTLAND, N. Y. U. S. A.



GUARANTEED
SEND FOR FREE SAMPLE



Lathes and Drill Presses
Especially for Blacksmiths and Machinists, also Hand and Power Planers and Shapers and Machinists' Supplies.
Catalogue M.
SHEPARD LATHE CO., 132 W. 2d St., Cincinnati, O.

RUBBER RUNABOUT, \$35.00
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TOP BUGGY, \$27.50
BUGGY TOPS, \$4.50
Write for 100-page Catalogue. It's free. Compare Our Prices.
BUOB & SCHEU, Estab. 500-520 EAST COURT ST. 1883 CINCINNATI, OHIO.



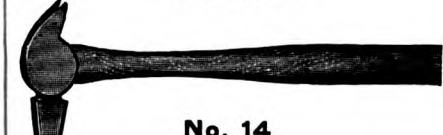
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CHAMPION TOOL CO.
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SCOTCH DRIVING HAMMER
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Carriage Painters and
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should know where to buy

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Carriage Painters' Supplies.

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Sign Painters' Supplies.

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Samples of Steel Wool
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Put cross thus X in square opposite whichever list or samples you want and sign below.

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Cut this out and mail it at once to

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108 LAKE STREET, CHICAGO, ILL.

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Same Day Shipments

Most smiths can't keep a large stock on hand—no room—perhaps not enough capital. Then why not buy of us? You want your goods at once, order of us and you'll get them P. D. Q.

You've heard the saying, "COOMBS QUICK SHIPMENTS." Remember it next time you have an order. Send it to us, we'll do the rest.

"SAME DAY SHIPMENTS" are what yours will be if you send them to us. We ship goods same day we receive the order.

That's where we beat the "other fellow."

TWO OF OUR LEADERS—

**BUGGY TOPS
\$5.00**

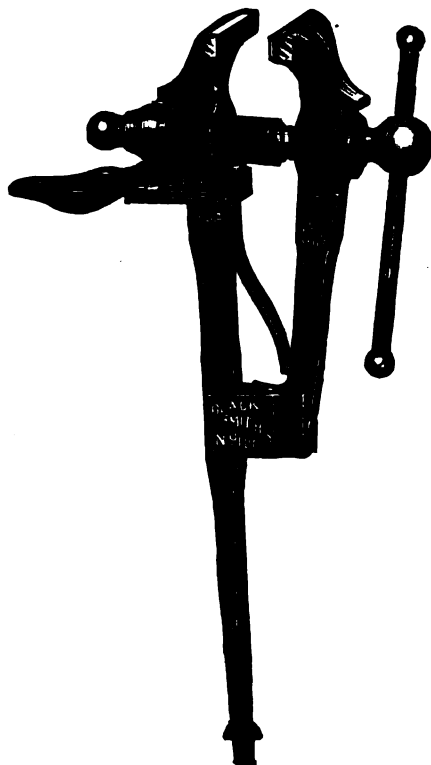
**HORSE NAILS
10c.**

HAVE YOU OUR CATALOGUE? ASK FOR IT.

DON'T FORGET—"SAME DAY SHIPMENTS"

EDMUND H. COOMBS COMPANY
217 EAST COLUMBIA ST.
FT. WAYNE, IND.

INDIAN CHIEF



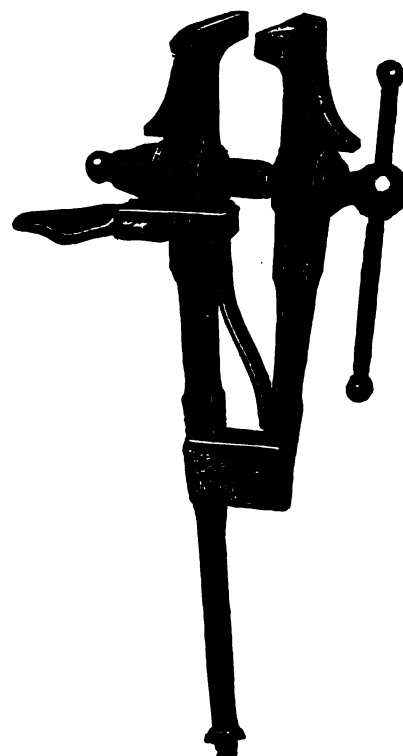
**BLACKSMITHS'
SOLID BOX VISE.**

**VICES,
AND ANVILS THAT
"Ring Like a Bell"**

MANUFACTURED BY

**—Columbus—
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**HORSESHOERS'
SOLID BOX VISE.**

Sold everywhere by
LEADING DEALERS
ENQUIRE OF THEM

THE AMERICAN BLACKSMITH

A PRACTICAL JOURNAL OF BLACKSMITHING.

VOLUME 2

AUGUST, 1903

NUMBER 11

BUFFALO, N. Y., U. S. A.

Published Monthly at 1338-1344 Prudential Building, Buffalo, N. Y., by the

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\$1.00 per year, postage prepaid to any post office in the United States, Canada or Mexico. Price to other foreign subscribers, \$1.25. Reduced rates to clubs of five or more subscribers on application. Single copies, 10 cents. For sale by foremost newsmen.

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Correspondence on all blacksmithing subjects solicited. Invariably give name and address, which will be omitted in publishing if desired. Address all business communications to the "American Blacksmith Company." Matter for reading columns may be addressed to the Editor. Send all mail to P. O. Drawer 974.

*Cable address, "BLACKSMITH," Buffalo.
Lieber's Code used.*

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When You Change Your Address.

We wish to impress upon our readers the importance of promptly notifying us of any change of address, so that there may be no delay or mistake in receiving their paper. It is especially important also when sending the change of address to give the old address as well as the new, so that we can locate the reader's card in our subscription file. If our readers will bear this in mind, there will be less annoyance and trouble about non-receipt of copies of the paper.

The Coming World's Fair.

Many are the notes and circulars that come our way from St. Louis. The whole country is making ready for a big showing next year—the biggest one, 'tis said, that the world has ever seen.

It would seem almost impossible that anything new should be devised to interest and attract the public, yet many novel features have been planned. Things so new that we have never heard of them, and things so old that we have forgotten them, will be brought forward to instruct and interest the whole world.

A tour of the world can scarcely afford a wider view of human life and customs of different nations than a visit to St. Louis next year. A careful study

of all the current magazines and books can scarcely afford a more minute knowledge of the times—that is, to the man who goes to St. Louis with eyes and ears open. Such a fair must prove a benefit to the rising generation from an educative standpoint.

The Addresses of Correspondents.

It has oftentimes been asked by the readers of THE AMERICAN BLACKSMITH why addresses are not given with the names which are published in these columns, especially in the "Queries, Answers, Notes" department. It is the endeavor of the publishers of THE AMERICAN BLACKSMITH to provide as interesting and valuable a journal for the craft as possible. To this end it is desired that all questions, answers and communications should be sent to us instead of to a correspondent direct. As a usual thing, a great many readers are interested in the questions asked and the answers which may be made. We are always glad to furnish names and addresses to those who wish to get into correspondence with any other members of the craft, but it is also our desire to give in the department referred to as many and complete answers as possible, so that all our readers may have the benefit of this exchange of views on various subjects.

If you can give an answer to any question, and know from experience that it is correct and practical, do not hesitate to send it in to us, simply because you think you cannot write as well as others. The Editor will gladly put your communication into shape for publishing.

Afterthoughts on our Conflagration.

In the July issue was inserted a brief notice of the fire which destroyed the offices of THE AMERICAN BLACKSMITH on the evening of June 19th. We took occasion at that time to thank our many friends for the expressions of sympathy extended to us, and while we have steadfastly resisted the temptation to say that we have risen "Phoenix-like from the

ashes," still we are glad to tell our friends and readers that our equipment and facilities are immensely superior to our former ones, so that we feel sure by improved service of meriting their constant support.

Finding the temporary quarters in the Mutual Life Building almost too small to accommodate our growing needs, we have permanently located in Buffalo's finest and tallest office building, where we have secured ample room for the proper conduct of our business. Our friends when in Buffalo should not fail to call upon us at our new offices, Nos. 1338-1344 Prudential Building. The view to be had from our windows of Lake Erie, with Buffalo's unrivalled harbor and the longest break-water in the world, will repay a visit to our new quarters.

Advertising a Modern Necessity.

It becomes more and more apparent in these days that advertising is an absolute necessity for the successful conduct of modern business. Competition is becoming keener, so that the man who does not keep his name constantly before the buying public is quickly lost to sight and forgotten. It is a reasonable inference that he who does not advertise, does not desire trade, and the tide quickly turns to the man who aggressively seeks it.

Advertising is nothing more or less than bringing together two parties, one of whom is in need of goods, skill or labor, and the other of whom can supply the needed commodity. There are many different ways of advertising, and the progressive man never allows an opportunity to slip which will aid in extending his reputation. Many ways are open to the blacksmith and the mechanic of small shops. A standard reputation for honesty and fair dealings, coupled with skill as a mechanic, is one of the very best advertisements. The liberal use of printer's ink, using good papers is unexcelled. The whole idea is to keep one's name and business before the eyes of those who may need your service. In

this issue of THE AMERICAN BLACKSMITH will be found an interesting article on the subject of advertising the smith

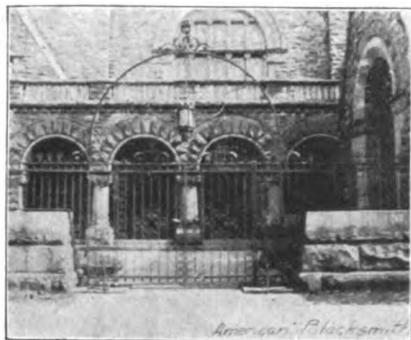


Fig. 1. MAIN ENTRANCE, FIRST PRESBYTERIAN CHURCH.

shop, being a continuance of an article on advertising appearing in our July issue.

The up-to-date man will realize that advertising should be considered as a necessary expenditure or investment, just as much as rent or material. In it lies the secret of making one's business grow.

The Value of Wrought Iron in Beautifying a City.

Buffalo is generally acknowledged to be a very beautiful city, both by nature and by art. Perhaps one of the prominent factors in the latter is the large amount of fine wrought iron to be seen on all sides. Wherever iron is used in structures, it is generally made to yield the highest degree of pleasure and satisfaction to the artistic eye. Walls, gates, grilles, hinges—in fact nearly every article made of iron, is a unique piece of art.

The accompanying group of engravings serves to illustrate a few pleasing instances of the uses to which iron is turned and the modes of embellishment in this city. The first three views are from photographs of portions of the First Presbyterian Church, The Circle. The remaining three are of handsome gates to different residences.

Talks to the Jobbing Shop Painter.—4.

M. C. HILICK.

Unhanging and Hanging of Carriages.—
Inspection of Work.—Unhanging Farm
Wagons, Platform Wagons, Outside
Platform.—Run-way, etc., etc.

The jobbing shop painter must be a master of emergencies, or, if you please, a many-sided man. Among other accomplishments he should be able to unhang a carriage alone. There are seasons of the year when business will not warrant extra help in the shop, and it becomes an important matter of information to know how, for example, to

unhang either the single or double seated carriage.

The unhanging of a vehicle by a single painter can be done without an unusual outlay of strength or time, and the method is as follows: If a top job, unloose all the nuts that hold the top, but do not remove them. Then remove hanging bolts or other attachments connecting body to running parts. Next raise axle up and remove wheels, either front or rear wheels, according to the style of the body. Follow this operation by firmly grasping the axle free from its wheels and carrying it clear of the horse and lowering axle to the floor. Next set a shop "horse" or "jack" under the other axle, so that the remaining wheels swing clear and then remove the wheels, after which lower axle to the floor. Then

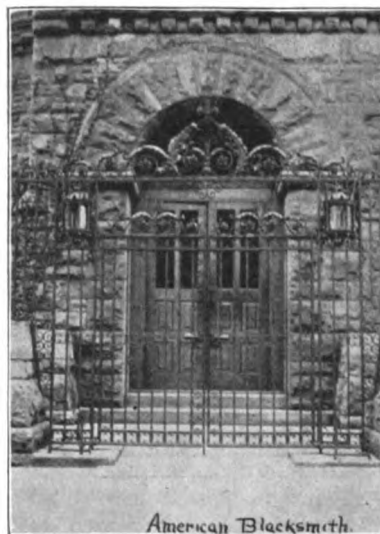


Fig. 2. SIDE ENTRANCE, FIRST PRESBYTERIAN CHURCH, THE CIRCLE, BUFFALO.

remove nuts holding top in place, and stepping into the body of the vehicle, take a firm hold of top and step out. Lastly, lift the body from its bearings, and the work is complete. In unhanging carriages preparatory to repainting, it is important to have an eye out for the future.

It is a good plan before unhanging a job to look it over and see if there are any parts which it will be difficult to attach after the job is newly painted. Many parts of a carriage can be easily removed before painting, with impunity. But when newly painted and varnished the parts cannot be so easily replaced because greater delicacy in handling must be exercised. Hence it should be a careful study to unhang the work so far as possible in a way that will permit easy and quick hanging off without injury to the paint and varnish. Along this same line, too, the work should be

carefully inspected and if any defects or breakages exist they should be repaired before starting through the paint shop. Bruised or broken threads on bolts are particularly aggravating, especially if left for repair until after the job is finished.

The bolt that turns in taking out will do the same thing in putting in. Better have it fixed before painting the vehicle. In fact all of these minor repairs, insignificant in themselves, total up enormously, and, if not closely looked after before repainting, are likely now and then to absorb the entire profits of a job. In estimating the cost of painting carriages and wagons in these days when so many of them are fearfully and wonderfully made, a close examination should always be made of the style of hanging off. It will be necessary to add from 20 to 40 per cent for taking apart and putting together. Farm wagons, of course, are an easy proposition and all one has to do is to place a strong jack under each axle to permit removal of the wheels. On trucks, furniture vans, etc., it is simply a matter of removing pole or shafts, freeing the king bolt, raising the front end sufficiently to allow the front gear to be run out, and then setting a barrel in place of the gear.

Place a strong jack under rear axle, remove wheels from both front and rear axle, and then proceed with repainting operations.

Platform gears may be disconnected in the same way if plenty of room is at command and light repainting only is to be done. Such unhanging has the merit of reducing the labor of handling to an important extent, and in the line of



Fig. 3. SECOND SIDE ENTRANCE, FIRST PRESBYTERIAN CHURCH.

medium and heavy work this is a consideration of the first moment.

Completion has reduced the profits of painting to such a close margin that a keen survey of all the details connected with a carriage or wagon from the moment of its entrance into the paint shop

to the hour of its exit therefrom becomes an absolute necessity.

One valuable convenience the small village or country paint shop should have, and for that matter the pretentious city shop will find itself better off with the same device, is a platform for the outdoor drying and working of the



Fig. 4. GATEWAY OF RESIDENCE ON DELAWARE AVENUE, BUFFALO, N. Y.

earlier or foundation coatings of paint. If the shop is reached by an outside run-way, at the top of the run-way locate the platform. Make it as large as possible and perfectly safe, with a good strong railing around it. Attached to the small shop, the run-way has a double value. In fair weather it furnishes a place to run jobs that are not at the time being worked upon. And at all times, barring rainstorms, it furnishes a place to unhang or hang off work, or do many other bits of labor not so handily done elsewhere. Coats of lead dry finely in a dry, out-door air. Many carriage painters claim that one day out of doors in good weather will dry a coat of paint more than three days indoors. This may be an over estimate, but at any rate pure outdoor air will dry paint much more rapidly than the impure air of the average paint shop.

The outside platform from which a run-way reaches to the ground should be provided with a windlass strong enough to haul an omnibus or a modern depot wagon to the platform. If it so happens that the platform is provided with a roof, so much the better, because work can be carried forward on the platform in inclement weather that would otherwise have to await a more convenient day or be done inside the shop. At all events, the windlass should be well sheltered from the weather. With respect to the run-way, avoid making the pitch too steep. The longer grade will cost a little more at the beginning but it will prove the cheapest eventually.

This platform and run-way will be found one of the most convenient fixtures any shop painter can invest

in. There is nothing like pure, out-door air for successful work in painting.

(To be continued.)

Pointers on Wheel-Making.—2.

JOHN MILLIGAN.

Teacher of Carriage Building, Durham University, Newcastle, England.

Method of Constructing a Hand-made Wheel.

In many carriage factories in England the spoke is fixed for dressing in what is termed a holding or dressing machine (shown in the figure), fixed to the bench, and resembling a lathe, though the system of holding the wood between the bench and the workman's breast, protected by a leather shield, is still practiced in many parts of the country.

The spoke is shaped with a draw knife and straightened with a plane, the neck being dressed out with a spokeshave. The plane leaves ridges and marks which it is necessary to remove, and this is done most effectively with a jarvis. The tenons are cut and checked with a tenon saw. For smoothing, a file is resorted to, after which the spoke undergoes a process of sandpapering.

Stocks or Naves.

The stocks of hand-made wheels are usually turned in a lathe. When the wood is sufficiently reduced with gauge or chisel, the length is marked off with a



Fig. 5. ENTRANCE TO RESIDENCE AT THE CIRCLE.

pair of compasses and two pairs of calipers,—one set to the diameter of the front hoop seat and the other to the back hoop seat are used for trying. A $\frac{3}{4}$ -inch chisel is required for forming the ogee moulding on the face, the bead being raised with a small chisel, say $\frac{1}{2}$ -inch, and rounded

with a gouge. The shoulder is finished with a chisel from $\frac{1}{2}$ -inch to 1-inch, the gauge mark for the mortises is also scored while the nave is in the lathe. The



Fig. 6. ENTRANCE TO RESIDENCE ON NORTH STREET.

most difficult task the wheeler has to perform is the accurate mortising of the stock; the mortises are staggered or zigzagged, or in and out, the object being to brace the wheel and gain strength by leaving a quantity of solid wood between the mortises. The usual "dodge" or "stagger" is $\frac{1}{2}$ inch, but beyond this the wheel is weakened, as a considerable strain is thrown on the tenons of the spoke when a carriage is loaded. To prevent the wood splitting in mortising a nave, an iron hoop is fixed on each end, which is securely held in a pit dog, or a German cramp. Holes are bored with an auger, then the tenon of the spoke is laid over the hole, and the size marked less $\frac{1}{16}$ of an inch, so that in driving, the spoke may fit tightly; but if this allowance is exceeded the tenon will be crushed, and consequently spoiled. Though the wheeler has nothing but his eye to guide him in holding his buzz and cutting the mortise at the necessary inclination, correctness is ensured by trying the spoke in the mortise, placing the straight edge on the end of the nave, and finding the difference between this and the top and bottom of the spoke with a pair of compasses. It is an undecided question whether taking a small portion from each side of the mortise corners, to allow the shoulder of the spoke to sit firmly, or cutting the shoulder to suit the curve of the nave is preferable. If the spoke is so formed, the shoulders

have a tendency to split upward; and if the nave is cut its diameter is reduced; but as it is always better to deduct a little from a strong part than a weaker one, cutting the nave is probably the better course.

Driving the Spokes.

This is done by sharp blows from a mallet or hammer, the weight of which should vary according to the strength of the spokes. A thin coat of glue is sometimes applied to the mortise and tenon, though a properly seasoned spoke requires no aid of this description. Driving should be performed in a wheel pit, where the workman has perfect control over both stock and spoke, and can do his work much more expeditiously than by having to follow the stock over the floor of the shop after each blow. Though pits are not so general as they might be, the cost and trouble of their erection is so trifling, compared with the convenience and time saved, that nothing should prevent their extended use.

The wheel without the rim is laid horizontally on the bed of a tanging machine, which rounds the outer tenon of each spoke by means of a hollow auger, which can be adjusted to an extreme nicety. If this tenon is well and truly fitted, the wheel will be free from the common defects of loose spokes and split rims; but it should be borne in mind that a felloe or rim can be spoiled by driving too tightly.

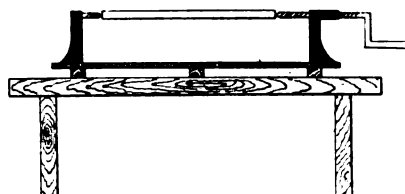
Tanging by Hand.

This is accomplished by placing the wheel on a pivot stool and cutting the tang with a draw-knife, which must be carefully done in a true line with the spoke, and as the exact size cannot readily be obtained in this way, it is necessary to wedge up the rim, *i. e.*, to drive a small wedge into the end of the spoke through the felloe to form a tight joint. If an adjustable hollow auger is used this defect is in a great measure remedied, as it can be set to cut a tenon of any size.

Felloes.

By carrying a straight line from the centre of the stock to the felloe the proper bevel for the ends is obtained, a little being cut away on each side of the line, so that when driven and wedged, the joints may be tight on the inside and slack on the outside, say from $\frac{1}{8}$ inch to $\frac{1}{4}$ inch being allowed, according to the size of wheel, which, being drawn up by the contraction of the tire, forms a perfectly close joint. They are now planed on their front or flat surfaces. This machine consists of a revolving disc, through which cutters project.

The wood is laid on the table and moved up to these cutters, which give a smooth surface to each flat side. The machine for shaping the inside or circle has an upright cutter spindle. The wood is held on a carriage having a pivot, which can be regulated to any radius, the carriage being moved past the cutter, which dresses up the curve. The holes must now be bored in the ends of the felloes to receive a dowel, which serves as a tenon to connect them. The dowels should not exceed 2 inches in length, that is, 1 inch in each felloe, otherwise they weaken the felloe. The holes for outer spoke tenons must also be made. This is done at a boring machine, in which the wood is securely fixed; but the boring machine in its many forms is too well known to require any description. When formed by hand, the felloe is fixed in a block or frame, and hollowed or bellied out with an adze to the requisite sweep. Being tried on, they are bored to receive the spokes and dowels with a brace and bit, and are dressed with a plane, the inside curve be-



A FORM OF SPOKE-TENONING MACHINE.

ing finished with a compass plane or spokeshave. The pivot stool is again called into use for holding the wheel while the felloes are driven on. When bent rims are used it is customary to insert a screw in the rim on each side of the spoke to prevent splitting, the heads being filed level with the wood; but little advantage is gained in new wheels, though it is useful when repairing split rims not entirely spoiled. The wheel is sometimes placed in a large lathe, in which the outside or tread is trued up. Where steam power is not available this may be done by turning the wheel on a spindle, the edge running close to a hand rest, which allows it to be dressed with a chisel. In many shops it is considered an advantage to have the felloes made to a fainter sweep than the circumference of the wheel when completed, or, in other words sawn out to the exact circumference of a circle 1 inch or so longer than the ultimate size of the wheel. The effect of this plan is to make all the felloes stand high at the joints. When the tire is put on, it forces the felloes down at the joints, these being the weakest parts of the circum-

ference. Hence, when the wheel is absolutely true before the tire is put on it will be slightly flattened at all the joints when tired; but by leaving the joints of the felloes a little high, as described, this flattening is counteracted, and the result is that the wheel when tired is perfectly circular.

A New Branch in the Repair Shop.

The repairman of the future may find among the jobs brought in, some to repaint or re-enamel the metal panels on the upper portions of automobiles. For the sake of lightness, many of the panels and finishings of a motor car are made of aluminum, and these must be kept painted to preserve them from the effect of the atmosphere. Although aluminum does not rust nor corrode in oxygen, it is acted upon by the damp ammonia in the air.

Painting these aluminum parts is quite different from gear painting, and requires special materials and special skill. There is a very marked tendency in paints and enamels to blister and peel off from the surface of aluminum.

The following is a good recipe for an enamel:

Three parts silicious sand.

One part chalk.

Three parts calcined borax (or else 3 parts broken crystal glass).

One-fourth part nitrate of potash.

One part diaphoretic antimony (well washed).

To make enamels permanent they must be baked in, for which purpose an oven about 6 feet by 6 feet by 3 feet will be required. Different fuels may be used, but gas gives the best results.

This new branch promises to open up a considerable field to the enterprising repairman.

Some Data on Hoisting Hooks.*

The following are some results obtained from experiments which had in view a comparison of the strengths of hooks bent out of round stock and hooks shaped according to Towne's formula, and also the effect of case hardening, or carbonizing, upon the strength of the above hooks. No attempt was made at mathematical analysis, the object being experimental data.

The general shape of the hooks tested is shown in the first figure. The eyes were welded, and pains were taken to have the lower curved parts of the hooks to be compared, alike as near as possible.

* Presented at the Saratoga meeting (June, 1908) of the American Society of Mechanical Engineers. JOHN L. BACON.

One of the conclusions drawn from the experiments was, that if the hook was properly shaped between the points

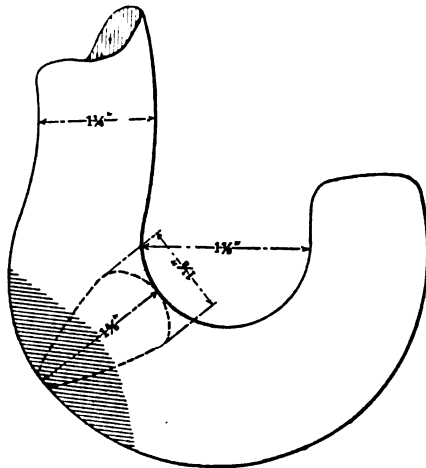


Fig. 1. GENERAL SHAPE OF HOOKS UNDER TEST.

A and B, in Figure 2, the shaping the rest of the hook had very little to do with the strength; the shaping of the rest of the hook having more to do with the "hang" than the strength. Of course

thickness of the carbonized coating of the mild steel was about $\frac{1}{8}$ of an inch.

The $\frac{3}{4}$ -inch hooks were all made from one bar of mild steel and both $1\frac{1}{4}$ -inch hooks were made from one bar.

In the following table the word "carbonized" is used to designate the hooks which were treated as described above. Those marked simply "carbonized" were allowed to cool in the box in which they were heated; those marked "annealed" were afterward annealed, and the ones marked "hardened" were hardened in the usual way.

Accompanying are the more important data from the experiments:

The first and third figures give the dimensions of the flattened hooks. These hooks were made to conform as nearly as practical to Towne's formulæ. The other hooks, bent into shape without any flattening, had the same inside curve as the flattened hooks.

The flattened hooks all gave way by compressing the metal shown by the shaded area. This was easily deter-

stand greater strains after they start to open. The detail report of the test on hook T was as follows: Very slight opening at 6,000 pounds load; open scant $\frac{1}{8}$ of an inch at 8,000 pounds; strong $\frac{1}{4}$ of an inch at 9,000 pounds; $\frac{1}{2}$ of an inch at 10,000 pounds; $\frac{3}{4}$ of an inch at 11,000 pounds; would not sustain load of 12,000 pounds any length of time, and opened rapidly at 13,000 pounds.

After the above test, and without disturbing the hook in the testing machine a load of 13,000 pounds was applied. The hook carried this load without showing any signs of further opening for about 15 days. At the end of that time the load was increased and the hook straightened almost to a right angle, after which it held a load of 15,500 pounds.

Power for the Blacksmith.

The subject of power in the shop is a very important one in these days, when mechanics are realizing that it is no easy matter by hand alone to get ahead in these days of modern methods and keen competition. The great necessity of getting some means of doing work faster and also doing the heavier work which is beyond the unaided strength of the mechanic, has resulted in the development of small power units for the shop, and today almost every up-to-date mechanic is using some form of power to help him out in his daily work.

When this fact is recognized, the question which naturally follows is what sort of power is the best for the purpose. The object of course is to obtain the greatest power with the least expenditure of money. The first cost of the unit itself, together with its fuel expenditure are to be thought of. Four forms of power are to be considered—

the critical part for strength lies at about the point C, the shape of the lower part merely determining the point at which the load will be applied. All of the hooks tested failed, either by bending or breaking, at about C.

When testing, working conditions were reproduced as nearly as possible. The hook was suspended by a loop of round iron run through the eye, the ends of the loop being gripped in the upper jaws of the testing machine.

A long link of round iron was put over the hook and through the lower head of the machine and a round bar passed through the lower end of the link under the head. This arrangement left the hook free to adjust itself to the strain in all directions.

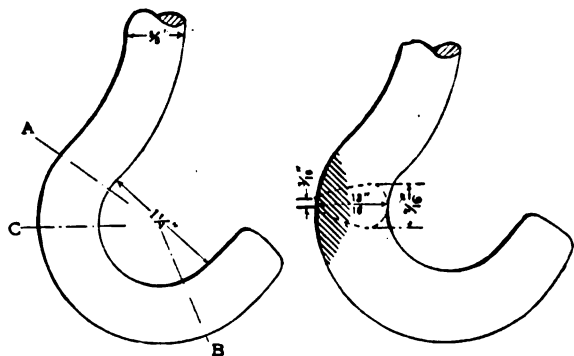
Some of the samples were case-hardened or carbonized. These were heated with granulated raw bone. The $\frac{3}{4}$ -inch hooks were hot for about 8 hours and the $1\frac{1}{4}$ -inch hook for about 9 hours. The depth of penetration of carbon, or

mined, as the scale at this point cracked off and was undisturbed on the other parts.

All the hooks which failed by bending stood a much higher load after the bend started; or, in other words, the hooks would stand a heavier load after they were partially straightened out, due, probably, to the fact that as the hook straightened, the leverage of the load was decreased.

The above data would seem to indicate that a hook made from round iron and carbonized, is about as strong as the same shaped hook flattened according to Towne's formulæ, while a plain hook carbonized and hardened is from 40 per cent. to 50 per cent. stronger than either of the other two.

The following may prove interesting as showing that the untreated hooks



Figs. 2 and 3. FLATTENED HOOKS WITH THEIR DIMENSIONS.

water power, electric power, steam power and oil or gas power as it may be termed. The writer will endeavor to give some ideas to aid the smith in selecting that form of power which will be of the greatest service to him.

The question of water power depends almost wholly on the location of one's shop. If a sufficient fall of water can be had without much expense for damming or building raceways, water wheels will prove the cheapest investment since after it is installed there is no fuel consumption or charge beyond simple maintenance and repairs. The chief objection lies in the fluctuation of water in different streams, which might in dry seasons mean that there would be no water to drive the wheel or turbine, which would result in a lack of power during such intervals.

In some sections electric current is

or a gas engine. Steam engines require a steam boiler in addition to the engine itself, which of course adds to the first cost of the equipment. They also require the services of an engineer to take care of both. A steam engine is of course a very satisfactory form of power, although of course when compared with the gas engine is open to two objections above named. Further than this, it is necessary always to build a fire and get steam before starting up, and after shutting down power much is apt to be wasted. These facts, together with the more careful attention which must be given to the boiler and engine,

this require but a few minutes attention from time to time to keep them operating in good order. They are perfectly safe, and any one possessed with an ordinary amount of intelligence can run the standard makes of gas engines with little or no trouble at all. The labor of handling coal and ashes is entirely done away with, and there being no boiler there are fewer parts requiring attention. The fuel consumption starts and stops with the running of the engine, and in addition the engine can be started on a moment's notice. This is a great advantage in some shops where it will be found advantageous and economical to

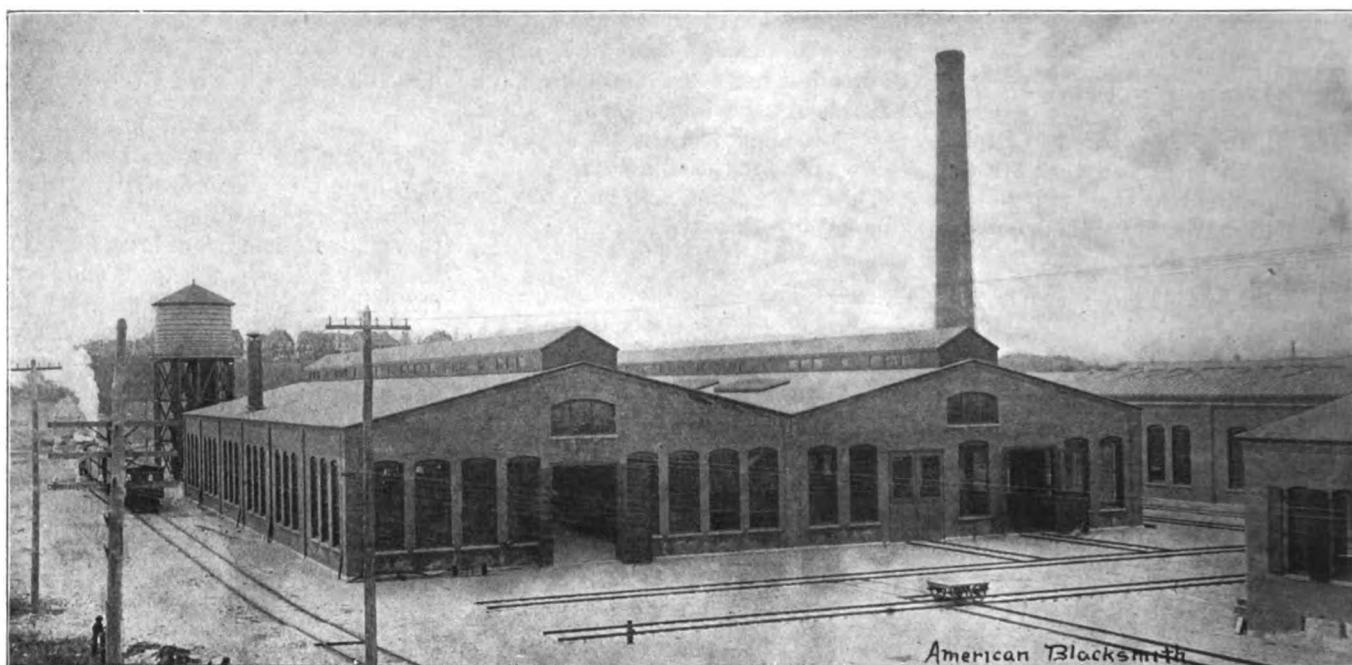


Fig. 1. THE FORGE SHOP OF THE NEW YORK, NEW HAVEN AND HARTFORD RAILROAD AT READVILLE, MASS.

available for fuel purposes, so that by putting in a motor, power may be very conveniently obtained. There is no more convenient power than an electric motor, since it may be started or stopped instantly, and if an electric current meter is installed the cost will be exactly in proportion with the amount of power used. One objection is the fact that the source of electric power may be subject to accident which would result in cutting off the supply or current at times when it may be most needed, but the chief objection to electric power is its high cost. There are very few localities in which electricity is not more expensive for power purposes in small shops than either of the other two forms of power which are yet to be described.

Steam engines and gas engines are perhaps the most popular form of power for shops, and the question at once arises whether to install a steam engine

lead us to believe that for small shops and shops where small power units are required, the gas engine is much superior. This has led to the rapid development of small gas and gasoline engines. In larger shops the superior advantages of the gas engine are perhaps not so strongly marked, but under ordinary circumstances, gas power is more to be desired in small units than steam. Of course, where there is a source of steam supply already at hand, as the boiler of an adjacent factory, so that steam may be had at all times at low cost and no bother with a boiler, some of the above objections to steam power do not apply.

Gas engines have been much improved and perfected in recent years, and are made to operate either on natural or artificial gas, gasoline or kerosene. Such engines require no piping, being complete in themselves, and further than

start and stop the engine several times during the day according to the way in which power is needed, and of course, when the engine stops the fuel expense stops also.

Owing to the high fuel value of natural gas combined with its comparative cheapness, this fuel is the best which can be used and is very much cheaper than gasoline. Gasoline power is also much cheaper than steam power, and in small engines of equal power conservative estimates make the cost of steam power run from two to three times as much as gasoline. Of course, fuel, water, attendance, oil and other items would all be included in both cases. Natural gas runs in price from twenty to forty cents per thousand cubic feet, artificial gas being much higher, costing anywhere from ninety cents to \$1.25. The cost of operating a 2½ to 5-horsepower engine for a

ten-hour day should not exceed ten or twenty cents for the entire day on natural gas, and from fifty cents to one dollar a day on artificial gas. This of course depends somewhat on the engine, on the fuel value of the gas and on the load which is put upon the engine. A 5-horsepower gasoline engine should not consume much more than from five to seven gallons of gasoline, running at full power for a day of ten hours.

The Forge Shop of the New York, New Haven & Hartford Railroad.

B. T. MURPHY.

The new car shops of this road at Readville, Mass., are practically com-

building. The over-all dimensions of the smith shop are 75 by 200 feet, and a machine shop of the same size is under the same roof, but separated by a 12-inch wall. From the general view in Fig 2, it will be noted that the forges are arranged along the outside wall and along the wall dividing the smith and machine shop in groups of four, back to back. The nearest fire is twelve feet from the wall. The groups are 18 feet apart, and each fire in the group is ten feet from the fire diagonally opposite. The forges are a unique and efficient type of the down draft forge, and especial attention should be called to some of its features. The fire pan is

steel plate forges, filled with cinder, making a very stable and durable outfit.

And now a word as to what is not visible to the visitor; that is, the underground piping bringing blast to the fires and carrying off the smoke and gases. Two lines for blast are laid directly under the center of the forges. Salt glazed tile pipe is used, cemented air tight at the joints, and decreasing proportionately in diameter as each branch is taken off. These branches have an easy bend up to the floor line, where they connect with the cast-iron blast pipe of the forge. This blast pipe has a damper for regulating the amount of blast to a nicety. Down the center

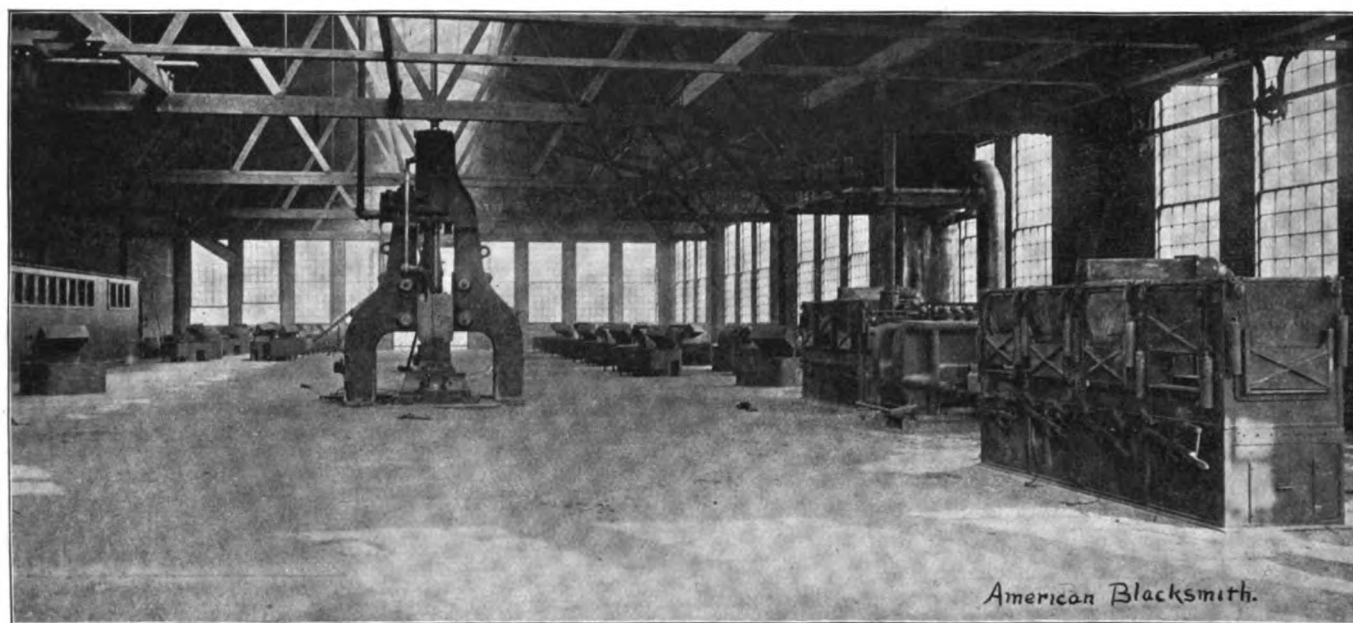


Fig. 2. INTERIOR VIEW. ARRANGEMENT OF FORGES IN GROUPS IN THE SHOP.

pleted, and to one interested in an ideal plant and equipment they are well worth a visit. All of the apparatus installed is modern and can profitably be used as a criterion for good engineering practice.

It is the purpose of this article to call particular attention to the forge shop equipment, as an example of the development and outgrowth from the old smoky, poorly-lighted smith shop of past years. The apparatus installed is essentially as follows: Three steam hammers, one forging machine, one bulldozer, two bolt headers, two heating furnaces (one eight feet long and one eleven feet long, inside dimensions) two combined punches and shears, twenty-six forges, twenty-six anvils, one blower and one exhauster placed upon an elevated platform, and motors for running the various power machines.

Fig. 1 shows an exterior view of the

48 inches in diameter, and is built of heavy steel plate. It is furnished with a down draft smoke exhaust hood of heavy cast iron, equipped with a worm gear for raising and lowering the hood, according to the smoke requirements and the convenience of the blacksmith. The anti-clinker dumping tuyere is also becoming an indispensable feature of the forge. Attached to the forge is a combined coal box and water tank. Altogether this forge is an excellent type for moderately heavy work. Fig. 3 illustrates the individual forge. On each side of the large steam hammer at convenient distances are placed two cast iron forges four feet square, with a depth of fire pit of twelve inches. These also have the down draft hood attachment. These forges will handle the heaviest class of work. All the parts exposed to the fire are heavily lined with fire clay and, in the case of the

line of the groups of forges underground is laid the smoke exhaust pipe. This consists of a brick duct for the first fifty feet, which then runs into the tile pipe. Double "Y" branches and easy bends connect the main to the cast-iron pipes, which are in turn bolted to the exhaust hood. The blower and exhauster for operating these lines of pipe are placed on a platform with the motor, and black steel connections run to the underground pipe (See Fig. 4). The outlet of the exhauster blows directly through the roof by means of a stack projecting some thirteen feet above the roof, and equipped with suitable rain guards.

This same blower and exhauster also furnish air and remove the smoke from the eight and eleven-foot heating furnaces. As indicated in Fig. 5, these latter are made up in sections of cast-iron plates heavily lined with fire brick

and equipped with a down draft exhaust hood. Air is blown into the wind box under the grates and up through the fire, and is kept from going into the ash pit by means of swinging doors of iron plate hinged at the back and operated by a chain and pulley. The heat and smoke are thus compelled by the exhaust to take a circuitous route to the down draft hood on top by a system of double arches. The hood is connected with the underground piping at the back of the furnaces. The charging doors are of heavy cast iron carefully counterbalanced. The grates are dumped by means of levers conveniently placed in front of the furnace, and ashes are removed from the ends of the ash pit through a sliding door. A characteristic feature of this type of furnace is its adaptability to future enlargements. Being built in sections of cast-iron plates, the furnace may at any time be lengthened by simply removing the end plates and putting on another section. The shops are built on old gravel pits, which gives a good floor surface, but which made foundations necessary for all the forges and machines, as well as the various underground air ducts. Each of the forges is on four foot square concrete foundation, neatly topped, as are the heating furnaces. It may be interesting to mention that the floor material furnished all the sand required for making the concrete.

Such an equipment cannot but appeal to the foreman who is in charge of the shop, the blacksmith who does the work, and even it may be added, to the casual visitor. No overhead pipe to corrode and rust away, to obscure the light or to be replaced every few years. An absolute removal of smoke, as it is carried off when generated and as fast as generated. The forges are cooler for the men to work at than the overhead canopy hood used in the shop of yesterday. In fact we might speak at length upon the advantages of the down draft system of smoke removal if such were the object of this paper. The writer has endeavored in the foregoing to give a bare outline description of the shop and not dwell on details, however many points of interest they may offer. Credit for the origin of this unique down draft system must be accorded the Buffalo Forge Company, Buffalo, N. Y., who have made a specialty of the development of the forge shop equipment to its present stage of perfection. This shop is an example of a thoroughly modern plant, and the equipment and arrangement are

well worth study and imitation. It demonstrates more clearly than words the value of up-to-date apparatus.

Kinks and Conveniences in the Wagon-Shop.—4.

BY D. W. M.

Carriage Repairing.

The first thing to be done when a "job" is presented for repairs is to examine it carefully and minutely to see that there are not other damages than those seen at first. Frequently some iron part or woodwork is broken which is not easily visible, and sometimes even a new tire would be economy for the owner. Also the spokes must be closely examined to see if the tenons in the rim are worn and if the tenons in the hub are broken and the mortise firm, for if



FIG. 3. VIEW OF INDIVIDUAL FORGE.

these are not in good condition, and the rim solid, setting the tire will be only a temporary make-shift, and most likely will do no good at all. Very likely it could not be set tight, and the work would prove a discredit to the man who did it. The customer must be convinced of these facts, unless you are mutually so well acquainted that you feel assured he has confidence in your judgment and honesty. If a repairman recommends doing certain repairs it must be on grounds that would appeal to the good sense, confidence and gratitude of the customer.

To make a reputation as a good workman requires something besides good work. Good judgment must be shown and one must have the courage to decline to do work in a discreditable manner. Let the cheap people who want their work done in a "slip shod" man-

ner go elsewhere. You get a wound every time you do work their way. In the majority of cases one should make a price on putting the vehicle in good running order, or in complete repair, and if anything is omitted it is to his discredit. It pays to cultivate the trade of the kind of customers who want work done well. That not only requires shop conveniences but ability to do the manual work well. Work should always be secure against loss by fire. This requires a form of policy specially gotten up to cover vehicles in process of repair. Many people will not send their carriages to a shop where they are not protected from fire loss. In the case of parties having a large amount of repairing done every month, such as a transfer company or livery stable, they require a special policy issued in their name for an amount sufficient to cover any probable loss.

If a vehicle is to be repainted, the wood work must be carefully examined to see that there are no cracks in the panels, or at the joints; no parts where the glue has come loose or the water has entered. If any such appear they must be repaired, for to rely on putty to cover such defects is to spoil your work. If the wood work be damp, though not loose, it should be given time to dry out. Many of the best carriage houses will not touch a job of repainting without giving the vehicle a week to dry out. This necessitates of course a dry, warm shop. Often the wood is rotted so badly on the inside (though apparently sound outside) as to require the removal of a part. The rotted part can seldom be patched with success. The bottom boards should always be carefully inspected, for it is a matter of personal safety to the owner of the vehicle, and if the bottom board should break through after having his carriage supposedly thoroughly repaired at a shop, he would probably take his trade elsewhere. It is unusual to find a vehicle in use a year or more without some of the bottom boards around the screw holes or nail holes rotted, and holding by no more than a soft rotted end of the wood. Moreover, the rotting of the bottom board is extended to the sill or rocker, as the case may be, and a still greater damage created. If a little paint here or there will protect from the ravages of water, don't wait to be asked to paint the job, but apply the paint where needed. It may be only a speck of varnish chipped off, yet where the varnish is gone the water will eat through.

Every vehicle left for extensive repairs should be thoroughly washed and

cleaned up before leaving the shop. It may not be absolutely necessary, but it makes an excellent impression and costs very little. Always examine the axles,

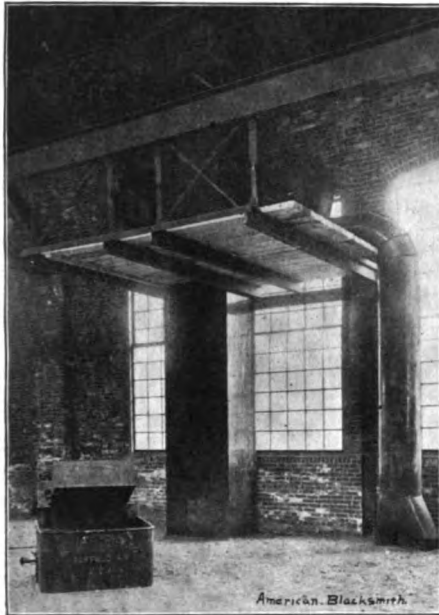


Fig. 4. VIEW OF BLOWER, EXHAUST FAN AND PIPE CONNECTIONS.

and oil and wash them if needed, using pure castor oil, after first wiping the box and spindle clean. A charge for this service is seldom resented, but in many cases it is best to do the work whether charged for or not.

Customers need educating, as a rule, in the case of vehicles, and it pays to have a little printed literature on the subject to hand to them now and then. They see that you understand your business and have respect for you accordingly.

In all regular repair work a bench near the entrance is of the utmost service, because a great deal of work can best be done there before going to the shop, and also much can be done there after the job has been through the shop, such as mountings or touching up, or small oversights can be rectified without disturbance to the workmen. In a previous article we described the axle-setting device and the hanging-off device. These may both be convenient to the bench and will be used in connection with all the work not requiring a specialist, and fitted up with appropriate tools.

In order to save handling of material, moving around of vehicles and for convenience in general, it is advisable to have the tire fire of the smith shop as near as possible to the entrance from the yard or room where the vehicles stand, so that a wheel requiring its tire reset can be taken off readily and run into the shop without disturbing men at their

work. The tire setter has a small department to himself, equipped with a forge, a bench with vise, tool rack, wheel stand, a drilling machine for tire and (in some shops) another for counter-sinking and one for boring holes in the rim. But in most shops the same machine performs all three operations by a change of bits, or sometimes where there are two spindles on the machine, simply shifting the wheel a little. The tire drill bit may be made with a counter sink cutter at the head and is generally so made now. Machines have been made to drill all the holes in a tire at once, but we have never seen them successfully adapted to repair work. In the tire setter's department should be included a rack for storing new tires so that he will not have to waste time in going to some distant part of the shop to get his material. In many shops the tire is kept in the cellar, or in some dark out of the way place. A repair tire fire would not use so much tire as one putting on new tire only.

There should be a series of boxes or pigeon holes for bolts, arranged against the wall or post convenient for the tire bolter. These compartments should be made so that bolts will not easily fall out, nor yet be too small for the whole hand to reach in and get at easily what is wanted. The keeping of bolts in paper packages strewn along a window

turned around in the fire. But where there is an electrical current and an electrical welding machine can be used, a forge can be dispensed with. If there is a forge, a power hammer for welding will be found an economizer, even if only a foot-power hammer. After the weld has been made, a heating furnace with the tire resting on revolving rolls to keep it turning will heat the tire evenly all around while other tires are being welded. Such a furnace is seldom seen in a repair shop, unless equipped with power, although but little is needed and a boy or a dog could turn the rolls. It will heat from a dozen to two dozen tires at once. Gas jets, coal, or wood may be used for heating. An open arrangement is sometimes used in which the tire lies flat, and gas jets are placed all around the tire. One tire at a time is commonly heated in this apparatus.

If a cold tire setter is used, the heating is generally dispensed with but some prefer to heat the tire, as the wheel need not be sprung so much out of position, and the cooling of the tire produces shortening enough to bring everything up tight, the cold tire machine simply making a neat fit, obviating the extreme nicety in measuring for length of tire when welding. But few repair shops are provided with these appliances and many people object to them, preferring the old careful handwork methods.

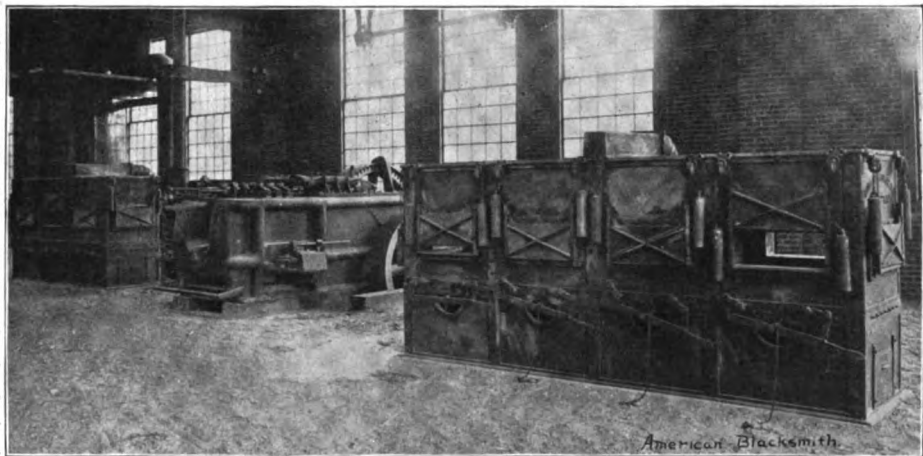


Fig. 5. HEATING FURNACES MADE OF SECTIONS OF CAST IRON.

sill or back of a bench is disorderly. The bolt cabinet should have each compartment properly and plainly labeled with the size of bolt it contains. Every smith's fire needs a bench with the customary smith's vise, and the tire fire needs it as much as any other, although in some shops it is omitted.

For repairs, an open forge is necessary with the chimney-hood set well back out of the way so that a tire can be

Nevertheless in planning how to arrange a repair shop and how the work is to be handled, the needed room for their operation, with convenience of access must be considered, if they are to be used, and whether the expense of room, and investment will be justified. In most repair shops it will not. In thousands of such shops there is no separate tire forge. But we think it pays to have one, even if the same men work at the two.

The All-Round Man.*

EDNA MANNERS.

He knows all the neighbors' horses, every age and gait and trick,
 He can find out what's the matter, and can right it neat and quick.
 Just a look, a nod, a hustle, and the work's as good as done.
 At the smithy fire you'll find him from the dawn to set of sun.
 Should a sudden break-down happen, he is always on the spot
 With his tools all in their places and his forge fire clean and hot.
 From the smallest to the biggest (he can make and mend and plan)
 There's no job on earth can daunt him. He's a good, straight, all-round man.

O, 'tis quiet of an evening when at last his work is done,
 And he sits and cons his paper—turns its pages one by one.
 Then he visits every country near at hand and far away,
 As he reads of all the great folk and the doings of the day.
 From his lazy pipe ascending, each white, dreamy ring escapes
 Wreathing memories and fancies into restful, pleasing shapes.
 So he sits, and, sitting, dozes, the past busy day to scan,
 With the peaceful satisfaction of the good, straight, all-round man.

* Written expressly for the August issue of THE AMERICAN BLACKSMITH.



Have you had a good season of wagon work?

A Good side line for this present season is rubber tiring. Have you undertaken it?

August—the sleepy month of the year, when business is slack and nothing doing. What is the prospect in your neighborhood?

Two-thirds of a horse's weight is borne by the front feet, 'tis said, while the hind feet are the most active in every one of his exertions.

If you promise to finish a job at a certain time, do so, no matter what else may have to wait. The reliable man whose promises are good is the one people want.

The Memphis Shoe for trotters has been patented by its inventor. License to use this shoe may be had upon application to Mr. W. H. Lake, Driving Park, Memphis, Tenn.

Good openings for blacksmiths exist in plenty in Northern Michigan, according to C. E. Gould, Central Lake, Mich. Mr. Gould will be glad to give further information.

One good way of recording the progress of your business is to have photographs taken from time to time. By comparing these, a fair idea may be had, at small expense, of which way things are going.

The first steel ever made in Mexico was recently turned out by the new \$10,000,000 steel plant at Monterey. This concern will make steel rails and structural steel of all kinds.

A Great mistake it is to keep the apprentice in the dark about the business and how it is going. Let him take part of the responsibility and he will feel a more personal interest in his work.

How about those old bills? If you have paid all of your own, you can go after collections with a better grace. Stale accounts lead often to bad accounts. Avoid them by collecting your money early.

With few exceptions men are naturally lazy. When an employer finds a man who is really and honestly willing to work hard he injures both himself and the employee by not acknowledging the man's superior worth.

A wise choice in selecting a trade is an important step towards success in this world; but having chosen unwisely the next wisest thing is to make the best of it and try to work up an interest in your work. Success will follow.

A little work in the shop during vacation will do a boy good, especially if he earns thereby something for pocket money. Children like to use their hands to accomplish something, and a taste for the craft may thus be acquired.

Carriage Painting may as well be made a work of art as not. It is a thing that is an advertisement in itself and one that appeals very strongly to the public. A stylish appearing vehicle is very striking, especially on a country road.

Understand your tools. If you have an engine, a power hammer, or any machine with complicated parts, try to know something about those parts and how they should fit together. It will save much trouble and expense.

The National Association of Wagon Manufacturers at a recent meeting, discussed the price question, and decided that, since the prices of all raw materials have advanced rapidly, an advance in the prices of wagons was a necessity. This is a step in the right direction.

A good workman who can do successful work with poor tools will do far better with first-class ones. But what of the poor workman or the inexperienced apprentice with poor tools? He will probably meet with utter failure and discouragement, and perhaps give up the trade.

A Strong Smith often overworks himself, just because he overestimates his own strength. It will all tell, in after years, perhaps in a complete breakdown. There is no reason why even a strong blacksmith should expect to do the work of a 5-horse-power engine. Yet many do.

To punish tardiness in men is a serious problem with many a smith. A new man should be admonished in a friendly way first and, afterwards, if he persists in breaking rules, he may be given a series of bad marks, and when these reach a certain limit, he may be fined, his wages lowered or he may be "laid off" for a time.

If you strike anything that you do not understand in our series on mechanical drawing, don't hesitate to ask about it. In order to obtain a thorough working knowledge of the subject it is very necessary to fully understand every article in the series without any hazy doubts.

It's not education that ensures a man's success, and it's not wealth nor long years of experience. Look at some of the clever mechanics who have risen to eminence as inventors without any of these. It's simply using his head, and pressing forward in spite of everything, with unflinching faith in himself and his powers.

A large sum of money is laid out by Wilkins in getting up signs to advertise his shop. Peters, at the next village does not advertise. People see that Wilkins is alive and up-to-date and take their work to him, so that Peters' custom grows less and less. Who pays for the advertising, Wilkins or Peters? Here's a problem.

That high building of brown terra cotta on the corner of Pearl and Church Streets, Buffalo, is the Prudential Building, and a very fine structure it is. Take the elevator and ask for THE AMERICAN BLACKSMITH offices. Here we are at last permanently located and ready to welcome our friends who may be visiting the city.

The solid wheel of antiquity cut round from a block of wood has gradually developed into the modern light, rubber-tired affair with spokes and hub and dish all made according to scientific principles, maximum strength with minimum weight. There is so much to be learned about a wheel and how to make or repair it that hints in this direction can never come amiss.

In the copper country, Ontonagon County, Michigan, a new find has been made of several ancient tools evidently used by the Mound Builders in separating the copper from the gangue. It is believed that the process was to build a large fire around the mass of copper and heat it very hot, then dash cold water upon it and pound out the metal with heavy stone hammers.

Trade education is well provided for in Hungary. In any community where there are fifty apprentices, the community must provide commercial instruction for them. Even should the number fall below fifty, if there is a chance of its again rising, the instruction must be kept up. The time spent in learning any trade is three years, of which ten months, at least, of every year must be devoted to instruction.

Nothing fancy for him, said Tom Tardy when we asked him about putting up a new shop sign. "Everybody knows I'm here."

Advertise? No, not he, they all know where to find him and what he can do. We tried to point out that people like to know that a man is alive as well as being at his old stand. Besides, new people might be attracted by knowing that an up-to-date blacksmith was waiting to be of use to them.

Tom couldn't see it though. Neither can he understand why his neighbor smith down the street, new comer though the latter was, did a much bigger business than he himself, who had been in the same spot for years. Tom is by no means a good reasoner.

American Association of Blacksmiths and Horseshoers.

The purpose of these brief words is to stir up enthusiasm among those craftsmen who have not yet taken any action towards getting together and securing the benefits of co-operation and organization. Now is the time to wake up and put forth the effort. Very little worth having is ever attained without striving for it. Talk up the subject with your neighbor blacksmiths. Make them see the advantages of forming an association to put prices at a proper level.

Do not let the summer slip by without having a better understanding among the smiths in your neighborhood. Take some action now while the roads are in good shape and all conditions favorable. Get the men of your town, or your neighboring towns or the whole county, to come together, talk it over and form an association. You can organize yourselves independently, or under the auspices of the American Association of Blacksmiths and Horseshoers. That association will gladly furnish all the aid possible, but by all means, organize. The American Association has the interest of the craft at heart, and wishes to see an organization of some kind in every locality because it knows the great benefits which organization means.

We are glad to report much good work being done in many quarters. The question is a live one, and every thinking craftsman will realize that something must be done, and done quickly. Hence it is that active work is being done, and associations formed in many localities. There is no reason why they may not be formed in every county. Will you be the one to make a start in your section? Write to the American Association of Blacksmiths and Horseshoers at Buffalo, N. Y., for plans for forming county associations.

The latest organization which has been formed is a flourishing association in Menard County, Illinois. The officers are: President, David Ziegler; vice-president, Fritz Tressler; secretary, Samuel Bryant; treasurer, William Faist. The following is a partial schedule of prices adopted:

Menard County Schedule.

Resetting four old shoes.....	\$ 1.00
Four new shoes.....	1.80
Resetting four shoes on stallion.....	1.50
Four new shoes on stallion.....	2.50
Two new bar shoes.....	1.50
Sharpening plows.....	\$.25 and .30
New Share, 12-inch.....	3.50
" " 14-inch.....	3.75
" " 16-inch.....	4.00
Landside bar.....	1.00
Landside plate.....	1.25

Pointing plows.....	.75
Pointing shovels, per set.....	2.00
Sharpening shovels, per set.....	.50
Setting buggy axles.....	1.25
" " " cold.....	.50
New stubs, one-inch.....	6.00
" " 1½-inch.....	7.00
" " 1½-inch.....	8.00
New T-iron in shaft.....	.50
Welding tongue brace.....	.35
Shaft shackles, per pair.....	1.00
Bradley shackles.....	1.75
Axle clips.....	\$.15 to .25
New buggy tires.....	6.00
New wagon tires.....	8.00
Fifth wheels.....	3.00
Wagon seat springs, each.....	.75
Bolster plates, per pair.....	1.00
Cast skeins, per set.....	6.00
Steel skeins, " ".....	8.00
Setting buggy tires.....	3.00
Setting wagon tires.....	2.00
Tongue cap.....	.50

Buggy and Surrey Parts.

Buggy or surrey pole.....	\$ 2.50
Buggy or surrey shaft.....	1.50
Odd styles extra.....	
Pole circle.....	1.00
Shaft crossbar (Extra with wood brace).....	1.00
Doubletree (old irons).....	.75
Doubletree (new irons).....	1.00 to 1.25
Singletree, sword end.....	.50
Singletree, round end (old irons).....	.50
Singletree, round end (new irons).....	.75
Axle caps, each.....	1.50
Head blocks.....	1.25
Spring bar, curved end.....	1.00
Spring bar, plain.....	.75
Straight double reaches, each.....	.75
Bent doubletrees, each.....	1.00
Single reach.....	1.25
End panel in piano body.....	1.25 to 1.50
Side panel in piano body.....	1.50 to 2.00
New seat only.....	2.00
New seat, panel back.....	3.00

Wagons.

Axles, each.....	\$ 3.00
Bolsters, each.....	1.50
Sandboards.....	1.50
Tongues.....	2.50
Bent front hound, each.....	3.00
Hind hound, each.....	.75
Coupe poles.....	.75 to 1.00
Wheels filled, tire setting not included.....	\$12.00
Wheels rimmed, tire setting not included.....	6.00
Wheels spoked, tire setting not included.....	6.00
Wheels cut down, per set, tire setting not included.....	6.00
Spokes, each.....	.25
Felloes, each.....	.30
New bottom, (old beams).....	3.00
Beams, each put in with bottom.....	.50
Beams, each alone.....	.75
New plain end gate.....	1.00

National Railroad Master Blacksmiths' Convention.

The annual convention of the National Railroad Master Blacksmiths' Association will be held in Buffalo, New York, August 18th, 19th and 20th. Everything points to a splendid convention, and no master blacksmith who can possibly attend can afford to absent himself. Arrangements have been made with the Genesee Hotel at Main and Genesee streets, Buffalo, to furnish every accommodation for the visitors. A pleasant session hall connected with

the hotel has been placed at the disposal of the Association for convention purposes. Every master blacksmith in the United States, Canada and Mexico has been invited to attend this meeting, which certainly offers the rarest kind of a chance for a highly profitable and enjoyable three days' outing. The present indications are that the meeting will be extremely well attended, and it seems to be an assured fact that a greater number of new members will be enrolled than at any previous meeting.

The following are the subjects for consideration during the convention.

Repairs of Steel and Iron Frames; Best Method.—John Coleman, Chairman.

Best Method of Preparing Scrap and Working Same to Make Good Iron for New and Repaired Locomotive Frames, Rods, Straps, etc.—S. Uren, Chairman.

Oil; Is It Successful as a Fuel for the Manufacture of Iron Axles, and Heating Iron Scrap for Axle Slabs?—Thomas McNeal, Chairman.

Piece Work; Is It Practical for Locomotive General Repairs?—Thomas Lace, Chairman.

Machine Forging; Its Advantages in Car and Locomotive Construction.—H. A. Folk, Chairman.

Tool Steel; Best Method of Forging and Hardening High Carbon Steel Cutters, Millers, Taps and Unequal Shapes.—G. F. Hinkens, Chairman.

Best Form of Oil Furnace for General Locomotive Shape Work, and Best Pattern of Oil Burner for Same.—W. P. Savage, Chairman.

Flue Welding, Iron and Steel; and Best Machines and Methods of Doing This Work.—G. Lindsay, Chairman.

Best Method of Forging Locomotive Rock Shafts and Valve Yokes.—H. Hinkens, Chairman.

Track Tools; Best Method of Making Same; Does It Pay to Make Track Tools Out of Old Locomotive Tires?—C. H. Corcoran, Chairman.

Best Kind of Tuyere Iron for Light and Heavy Work.—Robert Henderson, Chairman.

Case Hardening; Best Methods and Best Material to Do Good Work.—A. W. McCaslin, Chairman.

Frogs and Crossings; Does It Pay to Use Old Material for Repairs?—Thomas Rowland, Chairman.

Hammer Dies; What is the Best Material to Use for This Purpose for Hammers from 500 to 2,000 Pounds?—R. A. Mould, Chairman.

Best Method of Making Car and

Locomotive Springs, and Best Bath for Hardening.—J. W. Smith, Chairman.

This present meeting will be the eleventh annual convention of this Association. The officers for the past year have been the following:

President—John McNally, C. & N. W. R. R., Chicago, Ill.

First Vice-President—George Lindsay, E. & T. H. R. R., Evansville, Ind.

Second Vice-President—T. F. Keane, Ramapo Iron Works, Hilburn, N. Y.

Secretary and Treasurer—A. L. Woodworth, C. H. & D. Ry., Lima, Ohio.

Chairman Executive Committee—Benjamin Burgess, C. & E. I. R. R., Danville, Ill.

Chemist—G. H. Williams, Box 2027, Boston, Mass.

Foremen eligible to membership in this Association are those employed in railroad, car and locomotive shops, who are desirous of becoming more proficient in the blacksmith's art, and who, by the exchange of ideas expect to make themselves more valuable to their respective companies.

So far the success of the Association has been more than satisfactory and has gained for it an undisputed place among the mechanical associations of the country. The secretary is constantly receiving letters from leading mechanical experts throughout the United States and Canada, showing to what extent the work of the Association has been appreciated.

The increasing demand for greater skill on the part of foremen, especially in the use of tools for the economical production of forgings, should of itself be sufficient to induce all master smiths to avail themselves of the opportunity for self improvement that the association offers along this line.

The plan followed by the association is to hold meetings at least once a year, at which time the principles governing the treatment of iron and steel, as well as the changes which the metal undergoes, are studied. At these meetings papers are read and discussed with the view of arriving at the best and most economical methods of doing work. Men are not apt to improve with no other model than themselves to follow, but by coming together and exchanging ideas they learn from those more profi-

cient in the art. Blackboard illustrations and the noon hour convention talks supplement what is presented by the papers. These talks are exceedingly instructive and give rise to many new devices and methods. A systematic and persistent study of this branch of mechanics is not only necessary, but it carries with it a certain amount of dignity and commercial value that no ambitious master blacksmith can afford to ignore.

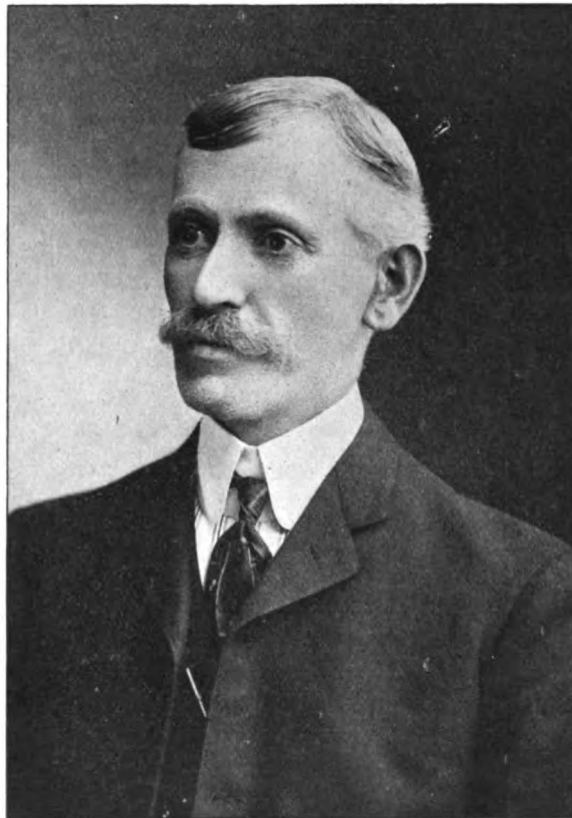
The cost of membership is merely nominal. Applications for membership should be made to the secretary, who will furnish a blank and such other information as may be desired. The papers and transactions of the Association are printed in the Proceedings. Enough copies are issued to furnish each member two, one of which is intended for his master mechanic, master car builder or

he was made foreman and is now in charge of the Company's principal shops at Chicago. As a man of sound original ideas Mr. McNally has few equals. He is conspicuous as a leader, yet so modest and gentle that his methods in dealing with those in his employ have made him a valuable man for the position which he holds.

Mr. A. L. Woodworth began railroad work in 1876 with the P. C. C. & St. L. R. R. Co., at Logansport, Ind., from which place he went to the D. & R. G. R. R. at Denver, Colo. Returning East in 1880, he entered the service of the Pennsylvania Co., at Ft. Wayne, Ind., and in 1884 was made assistant foreman. Mr. Woodworth accepted the position he now holds as foreman of the main shops of the C. H. & D. R. R. Co., at Lima, Ohio, in 1890. At the Boston

meeting in 1898, Mr. Woodworth was elected Secretary and Treasurer of the National Railroad Master Blacksmiths' Association, which position he has held with credit ever since. He is a mechanic of unquestioned ability, and an enthusiastic worker for the good of the craft and the welfare of the Association. It is largely through the efforts of this official that the Association has attained the position it now holds where its influence is felt and usefulness appreciated.

The Association is to be congratulated not only upon its flourishing condition and fine membership, but upon the splendid work it is doing in elevating the standard of the railroad blacksmith's craft knowledge.



MR. JOHN McNALLY,
PRESIDENT OF THE NATIONAL RAILROAD MASTER
BLACKSMITHS' ASSOCIATION.

superintendent, as the case may be.

The Association is to be complimented upon its splendid judgment in selecting as its leader for the past year, Mr. John McNally of Chicago. Mr. McNally commenced his railroad career as an apprentice with the C. & P. R. R. Co. After mastering his trade he made his way west, working in some of the principal railroad shops throughout the Middle States, and in 1874 took service with the C. & N. W. R. R. Co. Four years later

their density and strength. In the living animal the enlargement may be so great as to be plainly visible to even ordinary observation. The increase in size of the bones is most readily observed in those bones of the skeleton which are not covered with muscle or much other soft tissue excepting the skin. The bones of the face, the lower jaw and those of the legs below the knee and hock joints are the points where the enlargement is most commonly observed.

Diseases of the Foot and Their Treatment.—16.

Osteoporosis.

E. MATHEW MICHENER, V. M. D.

Osteoporosis is a disease of the horse which is characterized by certain alterations of the structure of the bones which undergo enlargement at the expense of

In some cases the spinous processes of the back bone are noticeably enlarged, especially at the top of the withers. On account of the very common enlargement of the bones of the face and jaws, the disease has received the common name of "big head," by which name it is well known in many sections of the United States. Osteoporosis has been known for many years in this country and in England, where it was described by a veterinarian as early as 1860. The earliest reports of the disease in the United States are somewhat later, and describe the disease among the animals of the Ohio valley. It is only within the last twenty years that the disease has been noted to any considerable extent in the Eastern or Atlantic States, where it now appears to be slowly but surely on the increase, especially in and about the large cities. The specific cause of osteoporosis is not known, yet enough facts concerning the disease are so well-known as to warrant the assertion that the disease is a contagious one. It is not observed in isolated stables, where there has been no chance of its introduction along with horses from an infected locality. There is abundant evidence that the disease can be transmitted from a diseased one, but it is not so clearly evident that a stable, in itself, may infect sound animals. While the evidence is quite conclusive that osteoporosis is due to a specific germ, as is the case with some better understood contagious diseases, yet the germ has thus far not been isolated.

The symptoms of osteoporosis vary in some particulars with the severity of the case as well as with the location of the most decided point of attack. The detection of the disease may be difficult in certain cases owing to the very slight alteration in size of the bones. Some cases show at first only a varying degree of defective movement, which one often hears described as a "tied up gait." The animal may show stiffness in movement of one leg only or may move with evident pain in almost every joint.

Lameness or stiffness of the hind limbs is rather more common than in front, but not rarely one front and one hind limb either on same or alternate sides are found stiff or lame. Another characteristic train of symptoms is

lameness or stiffness first in one or more limbs followed in a few days or weeks by the same evidence of pain in one or more new localities. Acute attacks of lameness from no very clearly visible cause are another characteristic; these attacks may come on while at work, or the animal may be found severely lame after a prolonged rest in the stable. The acute symptoms frequently pass away after a variable time to return again, or in more rare instances there is a sudden

molar teeth may become decidedly loosened in their bony sockets, rendering mastication about impossible. In cases in which the animal spends much of its time in a recumbent position it is generally found resting flat on its side and not in the natural position as taken by the sound animal. Bed-sores frequently form from contact with the stable floor.

The diagnosis of osteoporosis requires very careful examination in mild cases, while in advanced cases the detection of the diseased condition is comparatively easy. Possibly the disease may be mistaken for an attack of rheumatism, which is a very rare disease of the horse. In the examination of the bones of the face and jaw the age of the horse must be well taken into consideration as the size of the bones of the animal varies directly with the age, the outline of the bones of the young head is decidedly more rounded than is the case with the aged animal. This is of particular importance in the examination of the lower jaw, which is normally thicker and more rounded in the young animal than in the aged one. The various enlargements due to direct injuries to the bones of the head or legs must not be confused with osteoporosis; diseased molar teeth as well as catarrhal inflammation of the sinuses or cavities beneath the bones of the face may produce enlargements somewhat resembling those produced by osteoporosis.

Diseased teeth may cause tenderness and impaired mastication, but should not be confounded with the tenderness produced by osteoporosis. Bed-sores and general wasted condition may at times be the result of laminitis or founder, but examination of the feet should be sufficient to determine if laminitis be present. History of a previous case of osteoporosis in the stable may be of certain value in arriving at an early diagnosis of another and later case. It should not be forgotten, however, that while the symptoms in a given case may be acute and the course of the disease rapid, yet the next case in the same stable may run a very slow and almost chronic course and the animal remain useful to greater or less degree for months or even years. Much depends upon the constitution of the animal.



MR. A. L. WOODWORTH,
SECRETARY-TREASURER OF THE N. R. M. B. A.

fracture of some of the bones or a tearing loose of the attachment of the tendons or ligaments, causing the most acute suffering and total disability.

Very commonly the appetite and general health of the animal are normal, this may be the case even where the enlargement of the bones is so great as to be decidedly noticeable. At the time of acute pain, however, the appetite becomes more or less depressed, and the animal may be found down in the stall the greater part of the time. In some cases the appetite is uncertain and variable, and pressure upon the bones of the jaws may give plain evidence of the tender condition of the bone. Where the appetite is much interfered with of course the body weight of the animal is seen to be failing. In very advanced osteoporosis of the bones of the jaws, the

Treatment.

Curative treatment can scarcely be said to exist in this disease. The best results the writer has seen were obtained by turning the animal to pasture for a month or more, but this is far from being a benefit to all cases. The feeding of ground bone meal has been advised by some.

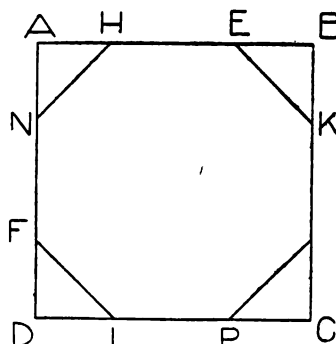
It is with prevention that the services of the veterinarian or other informed person can be of use in combating this disease. Some cases do seem to get well, but a large percentage suffer a relapse at a variable future time. It is better to consider even the apparently recovered cases as dangerous to stable with other horses, for it is not possible to determine their harmlessness except by trial, and it may prove expensive information. Such cases as are useful can be worked with safety if stabled entirely away from other horses or mules. Upon the removal of a diseased animal from the stable, it is best to disinfect the whole stable thoroughly. Thorough cleansing should always precede the disinfection of a stable, and all movable material should be included in the cleansing and disinfection. On account of the long period which commonly passes from the time of exposure of an

It takes only a short time to make one, and they sell for 50 cents. The knife should be 1 inch wide by $\frac{1}{4}$ inch thick at the back and should be ground smooth. The wedge is $\frac{3}{4}$ inch square at the base and $1\frac{1}{2}$ inches long. Hammer the knife at a low heat and leave it without temper and it will stand.

To Lay Out an Octagon—Hack Saw Hints.

BY JOHN.

Suppose one desires to round up a piece of iron that is two inches square. The easiest way is to first make an octa-



HOW TO LAY OUT AN OCTAGON.

gon of it. To do this quickly, measure the distance between the opposite corners as AC and BD. If these are

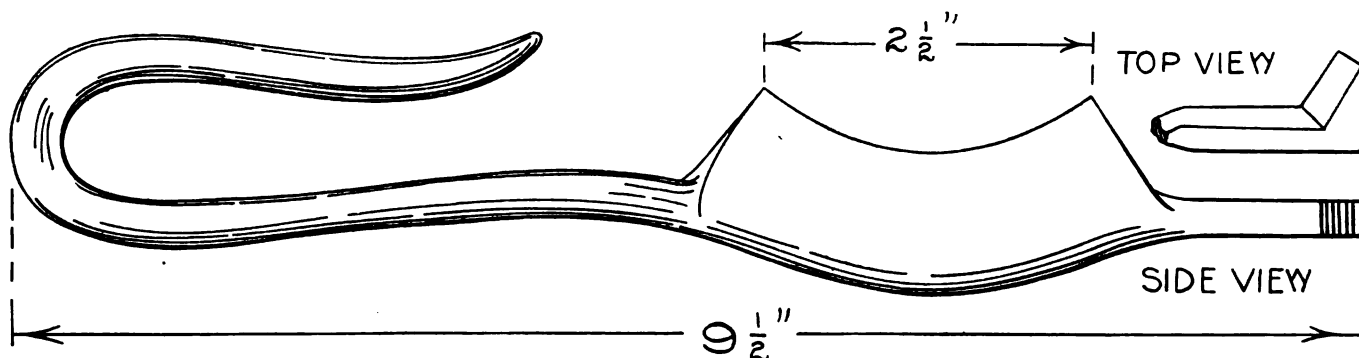
natural to the work. This saves mis-strokes and saws. I also find that when the saw is run the full length of the blade, the soft teeth at the front end of the saw will sometimes catch and cause the saw to break. I touch these teeth to the emery wheel or they may be dulled with a file.

The Railroad Blacksmith Shop.—10.**Repairing a Valve Yoke.**

W. B. REID.

The reduction of the working diameter of the valve yoke stem makes its renewal an occasional necessity. The method of repair will generally be determined by the shape and condition of yoke at base of stem. A yoke too much reduced at this point may have to be replaced by a new one. But where the stock is of reasonable proportions, the substitution of a new stem is good economical practice.

In doing this work the blacksmith is often heavily handicapped by unfavorable conditions resulting from bad machine shop practice in extending the finish of stem unnecessarily far down towards the yoke back and terminating in a sharp corner instead of a safe fillet. In consequence, an attempt to upset the



A VERY USEFUL AND ORIGINAL FORM OF ORCHARD KNIFE.

animal to this disease until the symptoms are pronounced, it is not possible to determine, for possibly a year or more from the removal of the last case, whether or not one or more of the remaining animals are diseased. For such reason it is advisable wherever possible to not add new animals to a stable containing horses which have been exposed to the disease.

(To be continued.)

A Novel Grafting Iron.

B. E. PEASE.

I have devised a grafting iron that is considered by orchardists as a good thing for cleft-grafting. The concaved knife makes a clean cut of the bark and sap of the stub instead of tearing it as with a straight knife.

alike and the distance approximately 2 and 13-16 inches, it shows the piece to be square. Set a gauge one-half of this, 1 and 13-32 inches, and gauge on from all four corners, as from A to E and F, B to H and I, C to K and L, and from D to N and P. Now work to the lines, LF and EK, etc., and one will have an octagon which, in pieces of this size and less can be more easily and quickly drawn in this manner than any other, and this wrinkle has been of much service to me.

A word more as to that, to me, indispensable tool, the hack saw: I am now using saws with twenty teeth to the inch with the best of satisfaction. Before using a hack saw see that the body and feet are not in a cramped position but

stock at base of old stem for the reception of the new one invariably results in a hopeless cold shut. With a good round fillet the part may often be successfully upset, and the new stem applied easily and inexpensively. As an alternative the stub of old stem can be used for working purposes, as shown in Fig. 41, A. and B. A is the best and safest method. The points of scarves lap securely over the sides of yoke, and thus avoid probable cold shuts at CC, Fig. 41. In both instances a deficiency of stock at base of new stem results.

Fig. 41, D, is a possible result likely to give much trouble in lining up stem for finish at machine.

Another method of welding new stem is shown in Fig. 42, A, which shows a

lap scarf deeply formed in yoke back, with a *bob* tool; the new stem scarfed to correspond.

An essential element of weakness in these methods, however, is the neces-

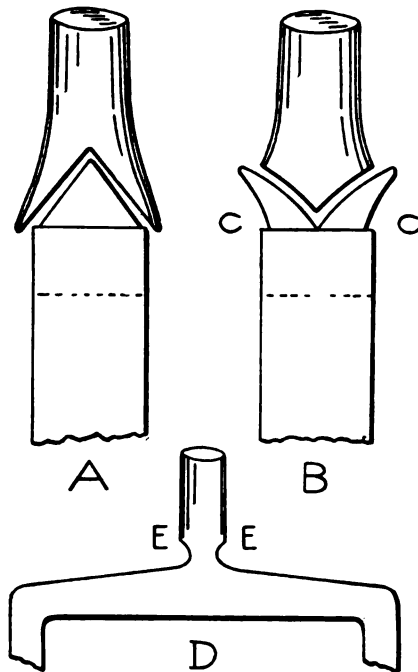


Fig. 41, A B.—METHODS OF REPAIRING YOKES AT BASE OF STEM. D.—RESULT LIKELY TO GIVE MUCH TROUBLE IN LINING UP STEM FOR FINISH AT MACHINE.

sary removal of so large a proportion of the surface of the welded parts in machining the stem to proper size. If left "black" these welds would prove strong and reliable; but since it is necessary to finish, the best way is to carry the point of weld safely beneath the operation of the machinist. This is the proper method, and is perfectly practicable and reliable in the hands of a competent workman. The other methods are, indeed, very often chosen by those of less confident ability, to whom the method we are about to describe seems of a more difficult and hazardous nature.

Fig. 42, B, shows clearly the method recommended. The cavity in yoke back should be made as deep as the stock will permit, and sufficiently wide to receive a large substantial scarf forged from the solid upon stem. The failure of a weld of this kind can only result from making the scarf too small and thin (Fig. 42, C.) The cavity in yoke back is made by first cutting out a small V piece, then working the stock backwards with a fuller. This enlarges the scarf sufficiently and augments surrounding stock for welding. To prevent the wasting and spreading of the yoke back do not heat the part beyond the possible point of welding; while the stem may be heated as high as

can be safely done. In the process of welding use two narrow, round-edged set hammers; the helpers striking the tools simultaneously and regularly, together. Do not prolong operations until the iron is too cold, but return quickly to the fire and take two good side heats, welding smartly with hand hammers. With clean heats and effective manipulation, a first-class job is the unfailing result of this method. The liberal margin of stock secured at base of stem also renders subsequent lining up and finishing at machine an easy result. The whole operation takes place at anvil into which a plate of suitable size, to preserve the contour of yoke, is keyed (Fig. 42, D).

In repairs of this kind the accurate adjustment of the new and old parts is often a difficult matter to those unfamiliar with the job. This may be easily avoided by carefully measuring and noting the exact position of the old centers in yoke and stem before commencing operations at forge; then afterwards restoring the new and old parts to same relative positions.

An attempt has been made upon some roads to overcome the wear of valve yokes by fitting a hardened steel sleeve over the stem; held in place by nuts, tightened against rod connection. Whatever advantage a device of this kind might possess would, however, be largely neutralized by a lack of that immobility highly essential in a part so important as the valve yoke.

Jones as an Advertiser.

BILLY BUNTZ.

Advertising, like smithing, has its kinks. To bring trade it must be handled in a logical way. There is just as much art in soliciting trade as there is in handling customers nicely at the shop.

Aside from calling attention to a certain class of work at the right time, is the knack of directing special attention to the advertisement itself. This is best done by illustrations. Some folk "run over" plain advertisements—even news items, in a dreamy sort of way, and when asked whether they read anything of interest, simply yawn a muffled "No-o-o," or answer, "The same old rigmarole." Perhaps the editor was dilatory in getting news, possibly the advertisements were worded listlessly. No wonder the reader was tired!

Good illustrations wake folk up. They lead them to read an ad. and to think about it. In fact, the illustration is to the ad. what a parade is to a circus.

Very few folk can refrain from seeing the show after witnessing a grand parade. "It was just fine!" is the testimonial that brings out the "stay-at-homes." Likewise, the progressive smith advertises at a certain time to do just such work as folk want done, and illustrates his ad. with suitable cut, so as to draw particular attention to what he has to say. The picture gives emphasis to the reading. Folk read such ads. because they appeal to them.

One Jones, who was a diligent advertiser, had his name on every tongue. "Jones' advertisements are always interesting." "Jones says he sharpens lawn mowers; tell him to call for ours." "I must take my scythe down to Jones; he advertises to grind one for a quarter." "Last week Jones advertised to clip horses, but I have none to be clipped, while this week he says he sharpens shears, and ours are so confounded dull I'm going to take them down."

In fact, it has become well-known that Jones does this, Jones does that, Jones does thus, Jones does so—Jones, Jones, Jones! Indeed, Jones is advertising *Who is he?* A year ago he had a wee shop like the one up the street which folk frequently pass on their way to Jones'. He has added improved

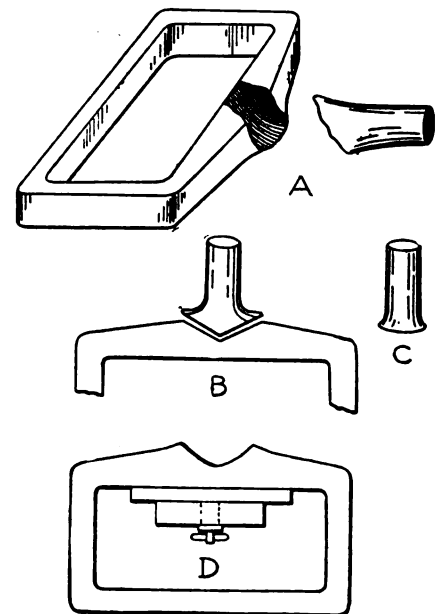


Fig. 42, A B.—TWO METHODS OF WELDING NEW STEM. D.—PRESERVING THE CONTOUR OF YOKES.

tools and new machinery, as well as extended his shop back to the alley, which gives him two entrances, so he can do the heavy work in the rear. Instead of having only one helper, he has a first-class smith who used to work in the shop up the street, two helpers and three

apprentices. He also has a delivery wagon.

"I had to do it," Jones would say, if

Come In and See It Run!

Talking about Power,
Well, say! Here's an engine that'll pull half a dozen small machines—Feed Cutter, Corn Sheller, Wood Saw, Churn, Washing Machine. Just the trick for pumping, as it runs "whether the wind blows or not."

USES LITTLE OIL
Your boy can run it. I am the agent and can tell you all about the good points and different sizes of the engine.

JOE BRADLEY
BLACKSMITH
TWO DOORS SOUTH OF POST-OFFICE

questioned about enlarging his shop. "Work just poured in on me; in fact, I surprised myself. Advertising did it." He knew how to go after the trade.

Plain advertisements serve well only when inserted amongst reading where they will be conspicuous, hence the local news column and the want column are about the only places they will be noticed. Even a plain advertisement receives more attention when preceded by an index, thus:

Plows sharpened and repaired promptly.—JONES.

Should this ad. be placed in the advertising column, the index, as well as the type, should be larger.

—PLOWS SHARPENED AND REPAIRED PROMPTLY.—JONES.

A word from the smith to the editor about these matters is sufficient. He is wise, albeit he doesn't know much about smithing and needs to be told the "talking points" which will appeal to the smith's customers and bring him trade.

Where the smith does several kinds of work, like Jones, he should not confine his advertising to the local news column or write only squibs; moreover, he should not generalize or simply say, "Prepared to do repairing," but rather he should state emphatically just what he repairs, specifying one or two things and dwelling upon them until he has said all that is necessary to appeal to his customers, regardless of whether the ad. takes up one inch of space or ten inches. Folk, nowadays, want to know exactly what can be done for them. If *plows* are what they have to bring, talk *plows* to them at length, mentioning other lines only secondarily, or in another ad.

or better still, save them to feed customers at another time. Where a dozen classes of work are mentioned in an ad. folk are apt to turn over the leaf to see if somebody else isn't saying something interesting about the particular thing they have for repair. The ad. that talks to the point catches the trade.

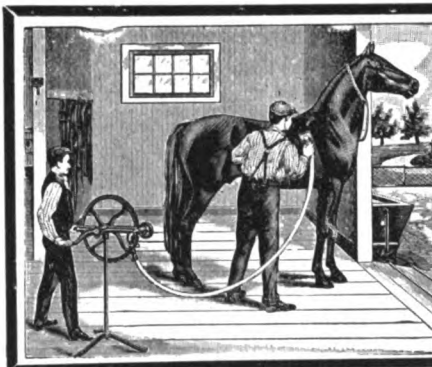
Supposing that at first Jones merely did shoeing, and not much of that, as he might have been a new smith or folk didn't know him. Among the reading in the local column he might introduce himself, thus:

Next week is Fair Week.
Strawberries at Marton's, 10 cents.

1318

Guess what that number means? Fresh Fish Friday.—Schwartz. Eggs, 10 cents.—Johnson. To that number bring your horse to be shod. Shoes of all kinds and sizes. I never injure the foot nor give a bad fit. Special tools for measuring, paring and shaping the hoof.—Jones, 1318 Main St.

These sample ads. are such as any smith may use. Jones says it's as easy



as letting one hand wash the other. Although he used to be a slender man, the waist-band of his pants is now like the bottom of a woman's skirt.

The sample advertisements on these pages are some of the kind that Jones and brother smiths use and profit by. Cuts can always be secured from the manufacturers at practically no cost.

Steel and How to Treat It—3.
Heating Arrangements—Coke Furnaces.
JOSEPH V. WOODWORTH.

In order to heat and cool steel properly it is first necessary that we have proper facilities; and while a plain ordinary forge may prove good enough for the heating of rough tools and parts, it will not answer for fine ones. When one considers that an accurate cutting tool or a die forging which has been properly forged, annealed, machined, hardened

and tempered, will accomplish many times more work than an imperfectly treated one, the expense incurred in

Bring in Your Wagon!

If it is loose, I can tighten it up in an hour or two. There's no need of using a rattle box. Even a general overhauling, a new tire, a few new spokes, new whiffletree, would take me only a couple of days, as my shop is equipped with tools for handling work quickly. Can sell you a new wagon if yours is ready to scrap. I take old wagons in trade. **JONES.**

installing suitable facilities is not to be thought of.

Although proper facilities are necessary and come first, they alone are not enough; it is also necessary to hire a mechanic who understands the treatment of steel. When this combination has been effected and a supply of good steel procured, satisfaction with the tools and parts treated will be an assured fact; if there should be any trouble, carelessness alone will be to blame.

There is only one way to heat steel

I'LL CLIP HIM
While You Wait.

Bring in your horse. Will make him sleek, stylish and proud. Renders currying unnecessary. No matter how good-looking the horse, I can improve his appearance. Can even make an old plug look smart.

JONES.

properly, and that is not to expose it to the action of air when hot, as the air

Do You Want a Guarantee?

You'll get it in that wheel. It speaks for itself, in fact there's no better made. That's why I recommend it. I have all sizes and kinds and can equip your wagon quickly. Can furnish axles or a complete wagon if that's what you want. Drop in and I'll tell you who is using these wheels, and why.
BOB EVANS.
Blacksmith & Wheelwright

Does It Look as Though It Would Break?

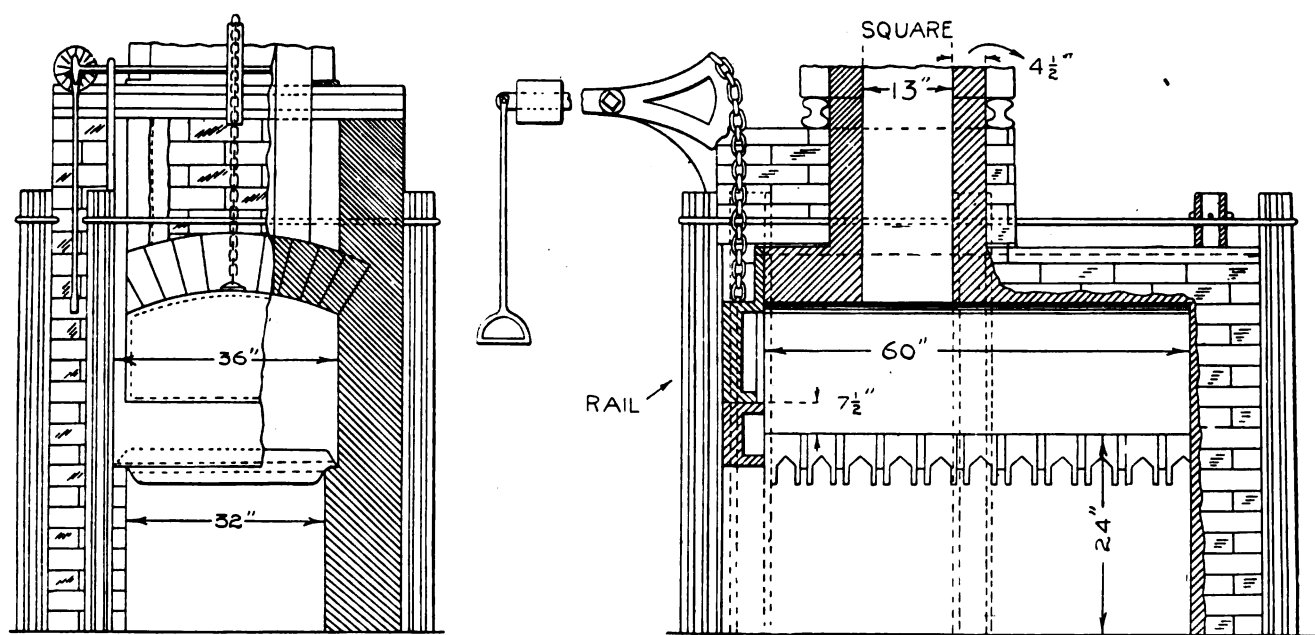
will decarbonize the surface considerably. To ensure success, remember the following: Heat the steel by means

which will ensure an even degree of heat and in a furnace from which all air is excluded. Never heat steel which is to be annealed above a bright red. Never heat to forge above the faintest scintillating point. Never heat a piece to be hardened above the lowest heat at which it will harden. The larger the piece the more time required to heat it. The heat will have to be higher for a larger than for a smaller piece of the same steel, because of the fact that a large piece of steel will require more time to cool than a smaller piece. For this reason, when a tool, forging or any similar piece is very large it should be hardened in a tank into which a stream of cold water is kept constantly running,

adapted for heating steel, and particularly for heating steel for hardening. These furnaces have been recommended by the Crucible Steel Company of America, who use them in their own works. The furnace is very simple and the sketches are self explanatory. All that is necessary is ten lengths of old rail about six feet long. One end of the rails is set into the ground, the tops are tied by $\frac{3}{4}$ -inch rods, and a piece of 3 by $\frac{3}{4}$ -inch iron is run around near the top and flushed with the bricks.

There are two principal features in a furnace of this kind, the fire bed and a good damper in the stack. In an experience of many years with furnaces of this construction the above named com-

this kind is clean, hard coke. As is well-known the clear gas of a clean coke fire allows of viewing the whole interior of a furnace, thus allowing of every piece within it being carefully watched and evenly heated. Fill the furnace up to the fore plate—even a little higher will be better—with pieces of coke not larger than one's fist. With such fuel when heating for forging purposes the damper may be left high enough to run the heat as high as required, even a welding heat being obtainable with ease. On the contrary, when heating for hardening the furnace should be brought to the proper heat before putting the steel into it. Then put the steel in and drop the damper down tight.



FRONT AND SIDE SECTIONAL VIEWS OF A COKE FURNACE FOR HEATING STEEL.

otherwise the red hot steel will heat the water to such a degree as to prevent the steel from hardening.

With regard to the proper heating arrangements, the nature of the work to be done, the amount of it, the size of the shop, the kind of shop, and other things will determine this. Thus the small or medium sized blacksmith shop will be able to get along very well with a couple of forges, a small heating oven and a supply of good coke for fuel; the blacksmith shop in which considerable heating other than for forging is done, will require a specially constructed furnace; while the large manufacturing shop, in which a supply of good gas is handy, may require a number of gas furnaces.

As to the best furnace for use in the general blacksmith shop, jobbing shop or tool shop, I know of no better one than that shown in the sketches. It is a cheap and handy furnace, especially

pany has found that the Tupper grate-bars with the $\frac{1}{2}$ -inch openings are the best. When these bars are set in as shown in the sketches a level and permanent bed is made, and an evenly distributed supply of draught to the fuel is ensured. In such a furnace one set of bars will last many years and will remain level. Although some are not aware of it, the satisfactory and safe working of a furnace of this type will be entirely prevented when square wrought iron bars or ordinary straight cast-iron bars are used, as such bars always warp, are pushed out of place and allow an excess of air to enter at one point and none at another. Thus hot and cold places in the furnace are caused and uneven heating of the steel results when heating for hardening. These are the chief causes of unsatisfactory heating in annealing, cracking in hardening, and burning in forging.

The only proper fuel for a furnace of

In this furnace the door is 12 inches high and 24 inches wide, and should be nicely balanced by a lever and weight, with a rod handy for the workman, so that he may pull it up with ease and turn over or shift his pieces in order to get a perfectly uniform heat.

Every medium or large size shop should have a furnace of the construction shown herein, as in the hands of a careful operator it will pay for itself twice over in less than a year. It will consume but little coke at a time, and when not in use the damper may be let down, when it will stay hot for a long time with but small waste of fuel.

I wish to impress one thing upon the minds of AMERICAN BLACKSMITH readers, which years of personal experience in steel treatment have demonstrated: *a smith at his anvil should never be required to heat for annealing, hardening or tempering his work in the forge fire.* This is

being done in hundreds of shops throughout the country today, and it is a most foolish and wasteful system. The smith's fire is not fit to heat for any process except that of forging, as this process—through hammering alone—restores to steel the qualities which have disappeared in the fire.

A furnace as is herein described will cost not over one hundred and fifty dollars, and may be used to successfully anneal, forge and harden all such tools as taps, large rolls, shear knives, rotary shear knives, dies and all pieces not over five feet long.

When a furnace of the proper sort is used for heating steel for hardening and tempering, the steel will be hardened and tempered best and will thus be the finest in grain and the strongest. A good quick way to find out the proper heat and to test for grain and strength is to hammer out a piece of steel about one foot long to $1\frac{1}{4} \times \frac{1}{2}$ inch and harden it at a heat which you consider right for such a piece. Then temper it to a high blue color, and when cold break off a piece with the hand hammer. If the grain is fine and silky, the steel has been heated properly and quenched correctly; the hammer will show whether the tempering has caused the steel to toughen, and the file whether it has given the steel the proper degree of hardness for the purpose desired. Not much practice will be necessary to become

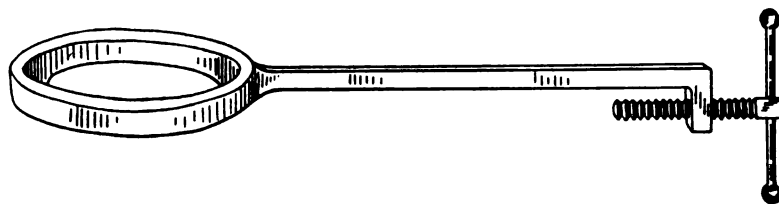
will form on it and destroy all its good qualities.

In the next chapter I will deal with the use of gas blast furnaces and forges for heating.

(To be continued.)

A Unique Bolt Holder.

There are bolt holders and bolt holders, of many kinds and degrees, but one of the most noteworthy that



SOMETHING NEW AND INTERESTING IN THE WHEEL REPAIRING LINE.

has come to our attention for some time is the patented invention of Mr. Herman Stade, Flandreau, S. D., shown in the accompanying illustration. This holder is made adjustable by the chain attachment, and may be fitted with different lengths of handle and different shapes of bits as C and C1, for various kinds of work. The inventor tells us that it will hold any size or length of round and flat bolts from turning, and will readily hold plow bolts in the shear and mould board. According to the familiar principle of the lever, the force applied on the handle is multiplied a great many times at the bolt. The inventor claims that with this tool a

venient one for bringing up rims where any part stands off.

I take a piece of one-inch by $\frac{1}{2}$ -inch iron, and bend it to a circle about ten inches in diameter. To the ends of this piece I weld another piece of $\frac{1}{2}$ -inch square iron, punch a hole in the far end, and bend down two inches, after which I cut a thread and place a screw of $\frac{1}{2}$ -inch iron six inches long in the hole.

This length will answer for any ordinary wheel. Put a handle in the end of the bolt, the same as a vise screw. This tool will give all kinds of satisfaction. It is operated by simply putting the loop over the hub and screwing up.

Note.

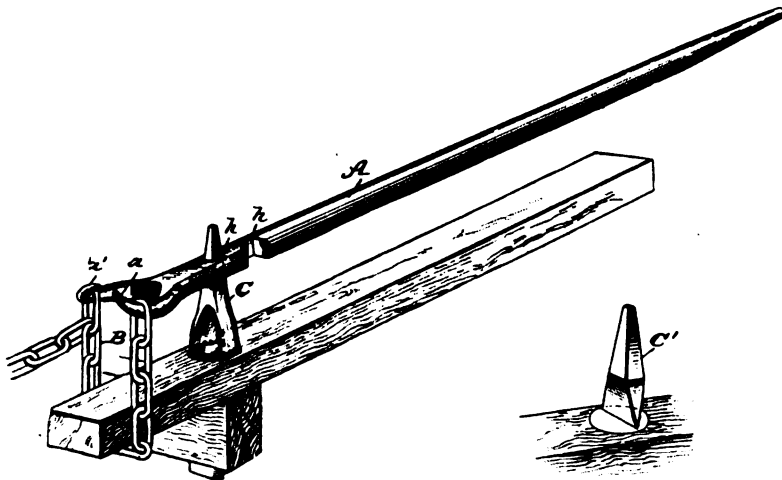
Owing to the great number of other important articles requiring to be published in this issue, we are obliged to hold over until September our next article on Mechanical Drawing. Henceforth, we hope, the series will continue without interruption.

The Editor.

Economy of Scientific Methods.

Many of the recipes in common use are very good in the hands of a man who understands them. However, it is only his experience that enables him to handle them satisfactorily. For instance, an old blacksmith may have a recipe for tempering that has been handed down to him from his great-grandfather. He knows from long experience just when the right shade of color is reached. He can guess the composition of the bath and he knows in the same way how long to leave the steel in it. However good his results, he cannot be certain of obtaining exactly the same every time, and another man, to whom he would try to explain his process might fail utterly. After wasting much time and material in unsatisfactory trials, he may make the recipe work to his satisfaction, but even then, since his own judgment alone serves him as guide and gauge, he is never sure how things will turn out.

The modern way is to employ scientific recipes or formulas instead of these guess-work methods. The study of the chemistry and nature of substances has enabled scientists to work out mathematically correct recipes, definitely



THE NEW BOLT HOLDER DEvised BY MR. HERMAN STADE.

skilled in this line, and it will not be long before the mechanic will be able to heat a piece to the proper heat for hardening and temper it for any desired purpose.

Lastly, in the use of a coke fire or furnace, never try to heat steel however fine in dirty fires, as you will decarbonize the surface and the sulphurous oxides, which are the greatest enemies of steel,

half-inch bolt can be so securely held that it will twist off before it will turn.

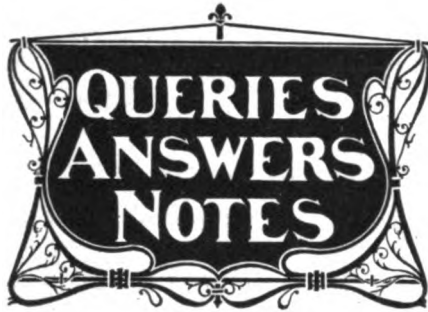
A Useful Tool for Wheel Repairing.

JOHN DOWSWELL.

The following tool will be found most useful in the wheel repair season. The tool which is illustrated and described on this page will be found a very con-

stating time, degree of heat and composition. By employing such, the intelligent novice can procure the same results as the expert.

The economy of such methods must be apparent to any blacksmith. Even when employing old recipes the thoughtful man will try to get to the bottom of the thing and work according to common-sense principles, on a scientific basis. The results will pay for the extra thought expended.



The following columns are intended for the convenience of all readers for discussions upon blacksmithing, horseshoeing, carriage building and allied topics. Questions, answers and comments are solicited and are always acceptable. For replies by mail, send stamps. Names omitted and addresses supplied upon request.

Shoeing for Shoulder Joint Lameness—I should like to have some brother smith tell me how to shoe a horse which has shoulder joint lameness. I should like to know what kind of shoe to put on to stop the lameness. PETER LEGAULT.

Horse Liniment—I would say to Mr. Thomas Robberts that the best liniment or hoof remedy is Morrison's English Liniment. I have tried several but find this to be the best. It is prepared by James W. Foster, Bath, N. H. L. C. DREW.

Blacksmith Coal—I should like to know the names of dealers in Piedmont and Rex coal. Also other kinds of blacksmith coal. Will some brother smiths discuss the different kinds of coke and coal and their individual properties? A. E. HIESTER.

Blacksmith Coal—Seeing William Foley's question with regard to blacksmith coal, would say that any coal dealer can get Cumberland White Ash coal which is bright and very free from dirt and stone. I think he will find this coal all right. I certainly do. L. C. DREW.

Drilling a Chilled Moldboard—I should like to obtain some information as to how to drill through a chilled moldboard of a plow. I have followed some of the receipts which have been already given, but they have all failed to give the desired results. I tried sulphur three times without success. Please let me know of one. G. H. BOURNER.

Interfering—With regard to the question on interfering by Jno. P. Winters, would say, use a Perkins Side Weight shoe, light pattern, with long toe calk with spur inserted in first inside nail hole, shoe fitted perfectly to the foot, outside heel calk well under, inside a little higher. This will do good in some instances. L. C. DREW.

Pacing to Trotting—In treating the horse mentioned by J. Archibald, it will depend a great deal on the driving which the horse has. I would first shoe with a heavy toe weight shoe with long toes on the front

feet and light behind with long toes. If that does not work, shoe as light in front as you can (no calks), and place a fifteen or twenty-ounce side weight on behind with no calks and short toes. E. W. MATTHEWS.

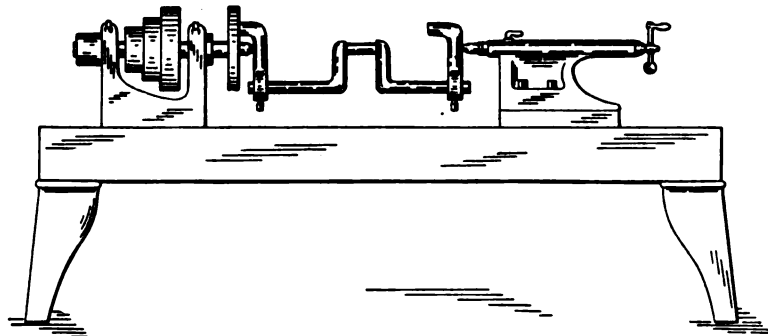
Tempering Mill Picks—In reply to J. F. Tramor, as to tempering mill picks or axes, would say that if he will take a half barrel of rain water, a half bushel of salt, a quarter pound of salt petre, and draw the temper to pigeon blue and cool in the same water, I think he will have no trouble in tempering axes, mill picks, butcher knives, and so forth. IRA A. MUNSON.

Interfering in Front Feet—I should like to hear from some of my brother smiths regarding a horse interfering in his front feet. The horse in question is one which I shoe. He strikes his front right ankle with his left foot, and I have never been able to shoe him to prevent it. His left leg bone seems to be turned. I should greatly appreciate hearing from my brothers of the craft. HENRY L. SWINDELL.

The Shrinkage of Green Wood—I am making wheels for a house moving truck out of green cottonwood. The wheels are twelve inches wide and twenty-one in diameter. I am boring 5½-inch holes in the center and wish to ask whether these holes will be smaller or larger after the wood is dried. I have asked every one that comes in the shop and half say one way and half the other. The man I am making them for is afraid that the boxes of five-inch gas pipe if put in the wheels will burst them, but I do not think that they will. I should like to know what others think about this. There are different opinions. JOHN TIEKING.

Tempering Steel—I should like to get a good receipt for tempering steel. I am sharpening drills for a mining company. As the rock is very hard, I am bothered with the bits splitting and breaking off. The receipt which I am now using is a solution of prussiate of potash, borax, and salt, but it is not satisfactory. I use Crescent and Canton steel. B. I. DAVIS.

Turning Small Crank Shaft—In reply to Mr. M. H. Matthiesen's inquiry



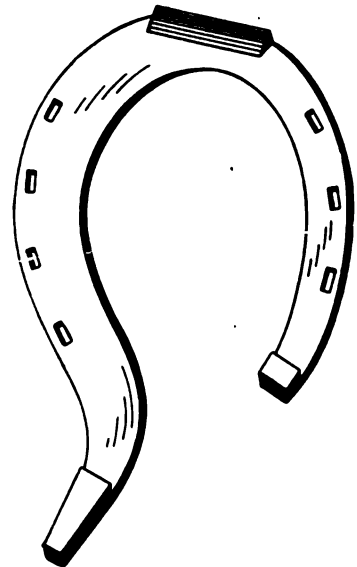
A WELL-TRIED METHOD OF TURNING SMALL CRANK SHAFTS.

how to turn a small crank shaft, would say that the sketch herewith shows how the crank is hung by placing two strong lathe dogs, one on each end of the shaft, and center, punching each one in line with the center of the crank. E. B. JONES.

Welding Toes to Wear Sharp—In answer to E. D. Hayden's question, would say that I use sickle sections, if I can get them, and make my toe calk out of Norway iron, welding them on. I then split the calk, welding in the steel with borax, as sand will not preserve the life of the steel. It will pay any one to use Norway iron for steel plug work, as it does not break off when split. When the calk is split, it should not be too thick, as the iron will not wear

away to leave the steel sharp. I split the heel before I turn it, put in the steel, draw the iron over the steel, weld and turn the heel in the vise, and I have no cold shut in a thousand shoes which cannot be avoided in turning the heel first. I split two heels at a time and weld in the same way. Try this method. E. W. MATTHEWS.

Shoe for Interfering—The accompanying sketch shows a very good shoe for



A GOOD FORM OF SHOE FOR INTERFERING.

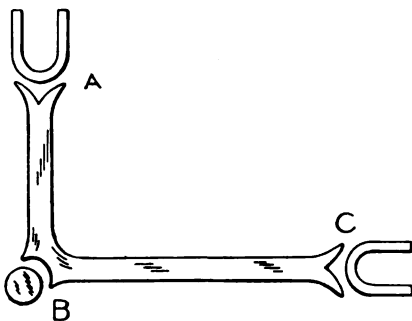
interfering. Dress the foot level and make the shoe about as heavy on the outside as it is on the inside, and let the end trail out backward to a fair length, as shown. Use a long heel calk and place the toe calk a little to the inside of the center. To me this is a very satisfactory shoe. C. H. W. RELYEA.

Interfering—In answer to John P. Winter's question on interfering in the June issue, would say the best treatment I know,

if it comes from weakness, is ground feed, and then they can carry their own feet. Other horses do it when they get a little tired. Now first make the foot level and see which side of the shoe she wears off first. If she wears off either side, you must use some method to make her break over straight. Use a side weight on the left foot and see that it doesn't cross the center in front. Also use weight on the outside, as sometimes the weight is not heavy enough to throw the foot away from the other. If she breaks over in the middle, it is all right. Weld the toe on straight. If she breaks over on the inside use No. 1 shoe, or if on the outside put the toe on the other way like No. 2 shoe. L. E. MORRIS.

Diseased Feet—I have ten mules in a bunch that I am shoeing, having diseased feet. The foot becomes decayed on the inside of the wall about one-half around the foot from one quarter around the toe to the other quarter. I can run a thin piece of iron around under the wall of the foot almost up to the hair. When the disease first starts the decayed part that I take out resembles dry putty. Will some one tell me what is the matter with them and how to treat them? O. C. DOWNING.

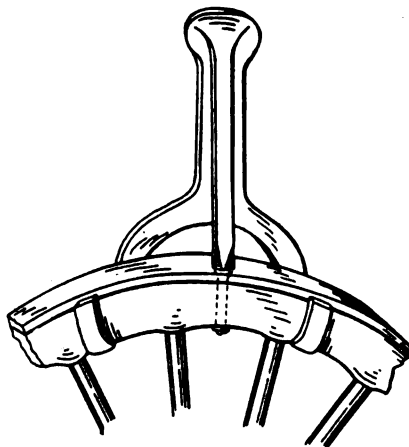
Engine Repair Work—I enclose a drawing, showing a piece of work which I did some time ago of wrought iron to replace a broken casting for a reversible engine. Take a piece of $\frac{3}{4}$ by $1\frac{1}{2}$ -inch iron and bend it edgewise in the elbow, cut it a little with a chisel while hot, and fuller it out. Next cut a piece of iron $1\frac{1}{2}$ inches in diameter and three inches long, and weld in at B. Now



METHOD OF REPLACING CASTING FOR ENGINE REPAIR.

split each end at the right length. Take a piece of $1\frac{1}{2}$ by $\frac{3}{4}$, bend it in the center and weld it in, which will make a strong fork. To make a split fork, after it is forged out, I drill the holes in their proper places, as in the old casting. The places to be welded are at A, B, C. W. D. BOETTLER.

Tire Bolt Holder—I was much interested in A. D. McShane's tire bolt holder described in the June issue. I have one similar, which however, is made out of a top brace. I took a brace and welded a piece of 1-inch by $\frac{3}{4}$ -inch soft steel on the end, split and opened it up, then bent it so that it would fit over the felloe. I next welded a piece of tool steel on the other end. I drew it down smaller than the head of a $\frac{3}{4}$ -inch bolt, cross filed it to four sharp points and



ANOTHER INGENIOUS TIRE BOLT HOLDER.

tempered it. I have a tire bolt holder which I think can not be beaten. I can spring it onto the felloe and it's always there when I want it. A. M. BURT.

Weak Feet—In answer to B. W. S., would say that when a horse is in any way weak in the foot, you must find out the weak

part and relieve the strain on that part. A rubber shoe or else a shoe with heels and toes on is all right, as you must use a shoe that does not have so much surface. These racing plates or toe weights jar the feet too much, as they come down too flat on hard roads. Or to make it still easier on the feet, sharpen the heels and calks. You can use almost any kind of a shoe if you put heels and toe calks on. Scientific Horse, Mule and Ox Shoeing, as advertised by THE AMERICAN BLACKSMITH will tell you all about it. L. E. MORRIS.

Interfering—In answer to Mr. John P. Winter's question in the June number, would say that it is hard to treat a horse, not knowing the conformation. I always build up the inside. If it takes six months to get the foot extremely high, use a common shoe with the toes set to the inside web, and do not fit any closer or shorter than the outside. When I take the wing off the inside, I get off just as much from the outside, especially at the outside toe. I build up the inside with sole leather to get them extra high. With chronic hitters, I make an extra heavy side weight bevel of the outside from center of toe to the heel and put a side calk on the inside web where they hit, and the heavy web on the outside. I am of the opinion that this mare has a small foot with which she hits, which is often the case with a one-foot hitter. E. W. MATTHEWS.

Ornamental Iron Work and Power in the Shop—I should like to ask some brother to tell me of a good book of designs for scroll and other bent ornamental iron work. I have made several pieces of this kind of work, such as flower stands, hat trees, etc., and find the work very interesting. I should especially like a design for andirons.

I wish to say a word for the Lambert Gasoline Engine made by the Lambert Gas & Gasoline Engine Company, Anderson, Ind. The engine is a three-horsepower one and I have had it for three years without paying one cent for repairs. I am also using the same battery that came with the engine. With it I run a band saw, two emery wheels, a hack saw and drilling machine.

I have taken THE AMERICAN BLACKSMITH since the first issue and have every copy to date, and they are not for sale at any price. M. F. LENFEST.

A Letter of Unusual Interest—Please find \$1.00 enclosed for which please send me THE AMERICAN BLACKSMITH for another year, as I like your paper and think it is a great help to the craft. The effort which you are making to protect the blacksmiths and secure better prices receives my hearty co-operation, and if we would all put our shoulder to the wheel and help, we could accomplish a great deal. I wish we could get a bill passed, prohibiting any one from running a shop without a license.

With regard to power, I would say that I think Mr. Scofield is wise in putting in steam power, as I think it is less expensive and less trouble than gasoline. The reason why I say this is because I have tried both. At present I have a two-horsepower Fairbanks Morse Gasoline Engine, which is about the best engine made and is all right, but by the time you take keeping them up and consider the leakage and evaporation of oil, I consider steam the cheapest. Water power is the best, however. I have water power, but our stream has been up so much this spring, that I put in a gasoline engine.

Will some brother smith please tell me what power hammer is the best for general work? I want to put one in and would like to get the best.

With regard to removing spokes from a hub, the easiest way I have ever found is to bore a hole through the center of the broken

spoke, and drive a chisel under each half and then with two chisels one above and the other below, work them out very easily. Will some one please tell me about the Concord hub. Is it better than the old-fashioned hub?

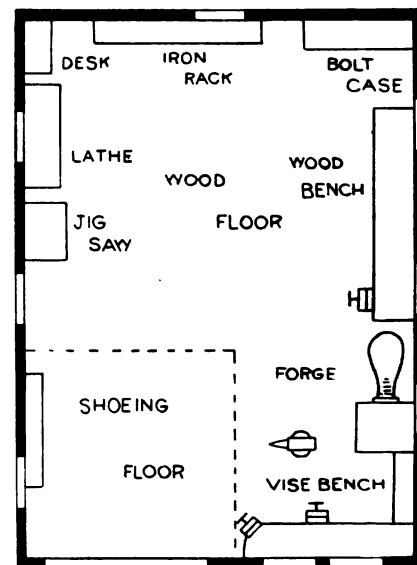
I will give some of our prices:

Horseshoeing, with steel.....	\$1.00
" plain .....	.80
Plow pointing.....	.35
Plow sharpening.....	.10 to .20
New tires	3.00
Old buggy tires	3.00
New buggy tires	4.00
Stubs, each	1.00
Filling wheels	3.00 and 3.50

I hear a great deal about stub welding. That is about as easy a job as I have. Scarf down and take the cleaver and cut a place or two in each piece, and with my welding compound, I never have any trouble. Instead of striking straight down I tilt my hammer handle and strike, and by this means keep it from slipping. I will give my welding composition:

Equal parts, English rosin, copperas, and red oxide of iron, pulverized and mixed with plenty of sand and salt. W. W. HERRING.

An Interesting Letter—I am living in a small town of about three hundred inhabitants with farming country surrounding. There are three other shops here and competition is sharp. I purchased the shop about two and a half years ago and do general blacksmithing, horseshoeing and wagon work. The following is a partial list of my prices. Some of the other smiths have lower ones.



VERY CONVENIENT ARRANGEMENT OF SHOP INTERIOR.

4 calked shoes.....	\$1.00
Sharpening (4 shoes).....	1.50
Resetting, each.....	.10
Toeing and setting, per set.....	.60
Setting tires.....	\$.30 to .50
New buggy tires $\frac{3}{4}$ -inch.....	4.00
New buggy tires, one inch.....	4.50
Spring wagon tires.....	4.50 to 6.00
Heavy wagon tires.....	8.00
New rims, per set.....	3.75 to 6.50

We have a co-operative butter factory here, also a milk shipping station which gives me a good business rebuilding milk wagons. I enclose sketch of the arrangement of my shop, which I think very handy. I have received many valuable hints from THE AMERICAN BLACKSMITH. I intend to build a foot power hammer, as described by L. VanDorin in the August, 1902, number. Every paper is worth a dollar to me or any other intelligent blacksmith. E. S. POTTER.

Prices Current—Blacksmith Supplies.

The following quotations are from dealers' stock, Buffalo, N. Y., July 25, 1903, and are subject to change. No variations have occurred since last month's figures.

All prices, except on the bolts are per hundred pounds. On bars and flats prices are in bundle lots.

Bars—Common Iron and Soft Steel.	
$\frac{1}{2}$ in., round or square; Iron, \$3.10; Steel, \$2.90	
$\frac{3}{4}$ in., " " " 2.70 " 2.40	
$\frac{1}{2}$ in., " " " 2.50 " 2.40	

Flats—Bar and Band.	
$\frac{1}{2}$ x 1 in., Iron, \$2.50; Steel, \$2.40	
$\frac{3}{4}$ x $1\frac{1}{2}$ in., " 2.40; " 2.40	
$\frac{1}{2}$ x $1\frac{1}{2}$ in., " 2.30; " 2.60	

Norway and Swedish Iron.	
$\frac{1}{2}$ in., round or square, \$4.90	
$\frac{3}{4}$ in., " 4.50	
$\frac{1}{2}$ in., " 4.80	
$\frac{3}{4}$ x 1 in., " 4.80	
$\frac{1}{2}$ x $1\frac{1}{2}$ in., " 4.20	

Horseshoe Iron.	
For No. 1 shoe, $\frac{3}{4}$ x $\frac{1}{2}$ in., \$3.40	
For No. 2 shoe, $\frac{3}{4}$ x $\frac{1}{2}$ in., 8.00	
For No. 3 shoe, $\frac{3}{4}$ x $\frac{1}{2}$ in., 2.90	
For No. 4 shoe, $\frac{3}{4}$ x $\frac{1}{2}$ in., 2.90	

Toe Oak Steel.	
$\frac{1}{2}$ x $\frac{3}{4}$ in. and larger, \$3.50	

Spring Steel.	
$\frac{3}{4}$ to $1\frac{1}{4}$ in. Rounds, Op. Hearth \$4.00, Crucible \$6.00	
$1\frac{1}{4}$ to 6 in. by No. 4 " 4.00, " 6.00	

Gauge to $\frac{1}{2}$ in. Flats. (Net Price per Hundred).	
$\frac{1}{4}$ x 2 in., \$0.54; $\frac{3}{4}$ x $2\frac{1}{2}$ in., \$0.82	
$\frac{1}{4}$ x $2\frac{1}{2}$ in., .58; $\frac{3}{4}$ x 3 in., .98	
$\frac{1}{4}$ x 3 in., .62; $\frac{3}{4}$ x 3 in., 1.81	
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$\frac{1}{4}$ x 3 in., .75; $\frac{3}{4}$ x 4 in., 2.10	

Tire Bolts (Net Price per Hundred).	
3-16 x $1\frac{1}{2}$ in., \$0.18; $\frac{3}{4}$ x $1\frac{1}{2}$ in., \$0.28 $\frac{1}{2}$	
3-16 x 2 in., .21; $\frac{3}{4}$ x 2 in., .81 $\frac{1}{2}$	
3-16 x 3 in., .27; $\frac{3}{4}$ x 3 in., .87 $\frac{1}{2}$	

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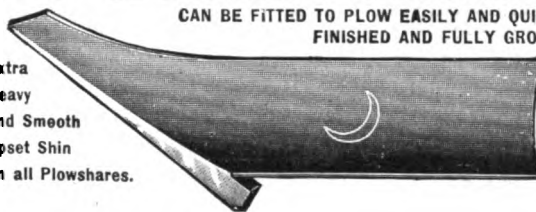
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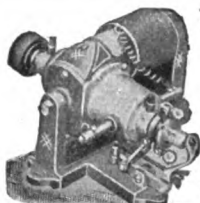
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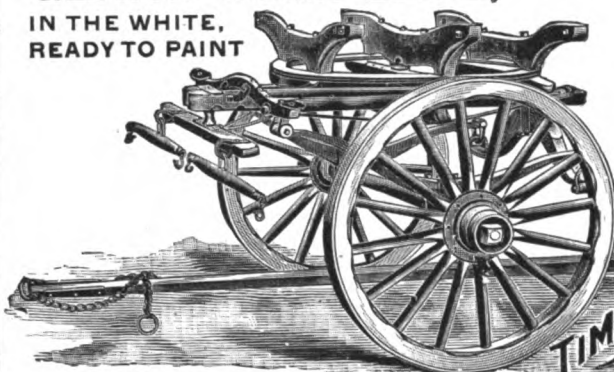
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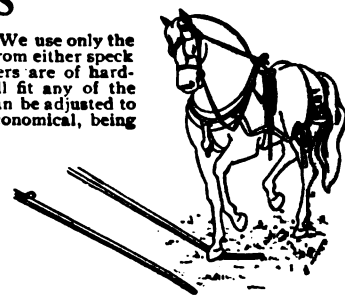
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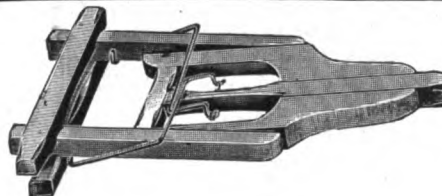
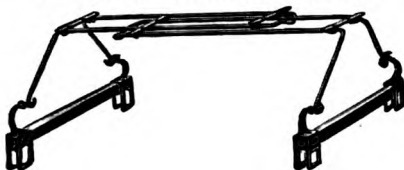
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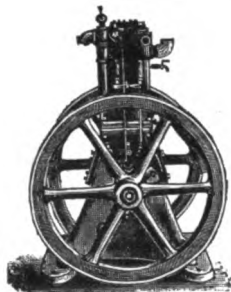
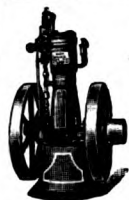
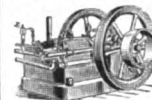
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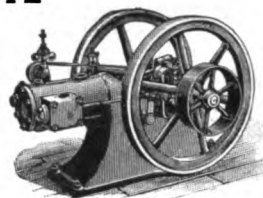
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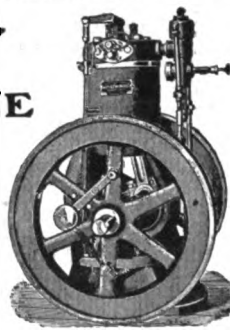
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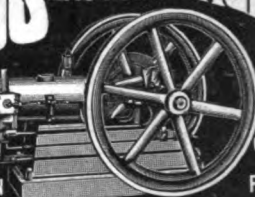
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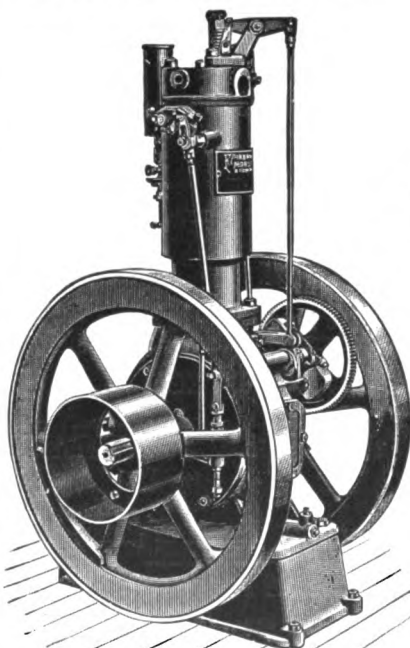
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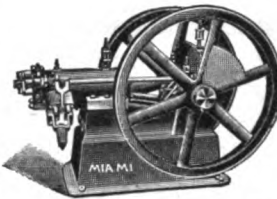
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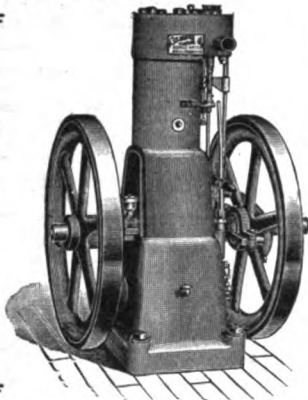
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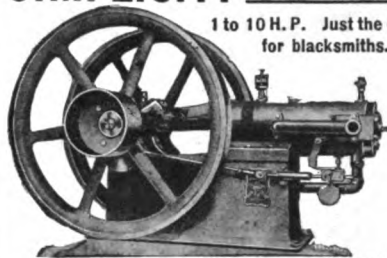
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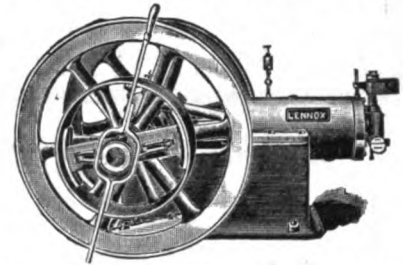
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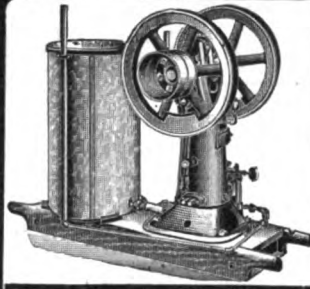
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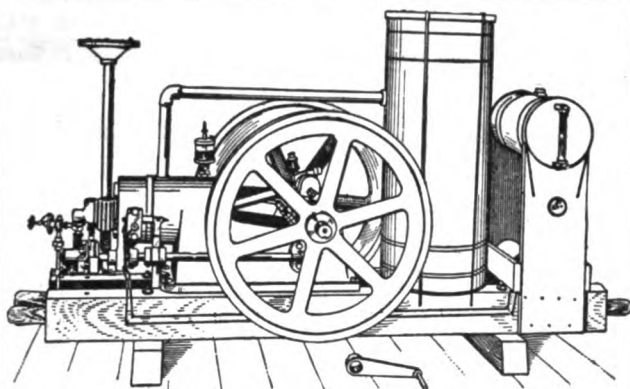
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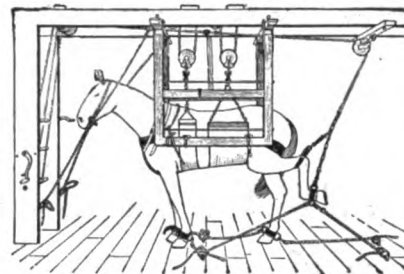
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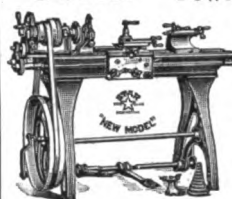
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"STAR" Foot and Power LATHES



Are used extensively by repair shops, tool-makers, gun-smiths, experimental and model makers, etc.

Built for durable and fine accurate service, containing throughout the highest type of modern construction.

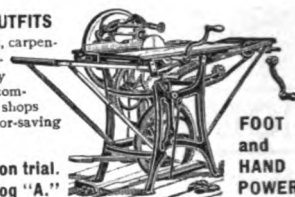
9 to 13-inch Swing.
Send for Catalog "B."

Wood Working Machinery

COMPLETE OUTFITS

Wagon builders, carpenters and wood-workers generally can successfully compete with large shops by using our labor-saving machinery.

Machines sent on trial.
Send for Catalog "A."



FOOT and HAND POWER.

THE SENECA FALLS MFG. CO.

274 WATER ST., SENECA FALLS, N. Y., U. S. A.

"TRINITY TRUE"

HIGH SPEED TOOL STEEL

PLENTY OF LATITUDE FOR HEATING. EASY TO MACHINE. NO TRICK IN TEMPERING.
ESPECIALLY DESIGNED FOR HEAVY CUTTING. BEST STEEL FOR HOT WORK.

WESTMORELAND STEEL CO., PITTSBURG, PA.



We Furnish Wheels

with Rubber Tires on for the same price as others charge for re-rubbing old wheels. We furnish all sizes with steel or rubber tire.
You are not prepared to meet competition without our prices.

Write quick for catalogue

AIR CUSHION RUBBER HORSESHOE PADS



SEE THAT CUSHION?
It fills with air at each step.
That's what breaks concussion.
That's what prevents slipping.
That's what keeps the foot healthy.
That's what cures lameness.

THE MOST COMPLETE Line of PADS On Earth

Air Cushion, Banner, Acme, Giant, Ideal, A. C. Road, and Racing.

CHEAPEST ON THE MARKET.

Write for Illustrated Booklet M.



Revere Rubber Company
MANUFACTURERS BOSTON, MASS.

Leather Aprons

For the Jobbing Trade.



Samples of Leather and prices on application

The **Hull Bros. Co.**
Danbury, Conn.

Kalamazoo Carriages



ARE made from the best selected materials, in the most workman-like manner, and every one is warranted for two years . . .

OUR proposition to dealers and repairmen is particularly attractive . . .

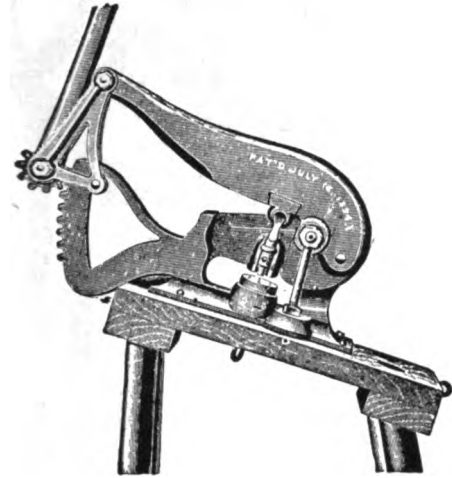
NEW STYLES
NOW READY

Kalamazoo Wagon Company

KALAMAZOO, MICH.

"Can't Do Without It" says the blacksmith with a Sears Blacksmithing Device

Combined Punch and Shear and Round Iron Cutter



THE Sears Blacksmithing Device, cut of which we present, is the most convenient tool in use. In using it the operator stands in front of the device, and can with ease handle the machine with one hand, leaving the other free to hold his work, giving him a full view of the work as it is done. This is a very commendable feature, especially in such work as trimming plow points, etc.

This tool weighs 250 lbs., and is mounted on heavy stand, covering 1 x 3 feet floor space.

It will punch a $\frac{1}{2}$ -in. hole through $\frac{3}{8}$ -in. iron. $\frac{3}{8}$ -in. hole through $\frac{1}{2}$ -in. iron, and is provided with the following sizes of punches:— $\frac{3}{16}$, $\frac{1}{4}$, $\frac{5}{16}$, $\frac{3}{8}$, $\frac{7}{16}$, $\frac{1}{2}$, and these punches are furnished with each machine. It will cut 3 x $\frac{1}{4}$, 4 x $\frac{1}{8}$, 5 x $\frac{3}{8}$ in. cold iron and will cut plow steel. It will cut any size bolt or bar up to $\frac{3}{4}$ -in.

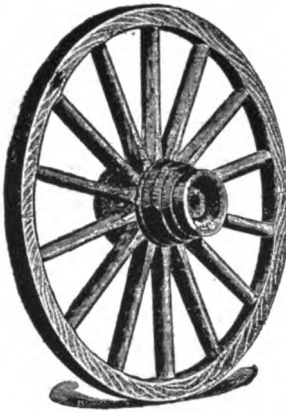
With each machine is furnished all the punches, dies and tools necessary for the work and each one is guaranteed.

For Sale by all Jobbers

Send for Catalogue

GEORGE SEARS & CO., CLINTON, IOWA.

SAVE MONEY IN ALL LINES



Our Net Price Catalogue free to those in the trade, will show you how to do it. We are prepared to furnish new carriage wheels with rubber tires on them, or can rubber tire your old wheels. See page 182.

WE MAKE

Wood Hub WHEELS

For Express and lumber wagons and they are

GOOD ONES TOO.

Send us a memorandum of the number sets you want, give size spoke, size hub, width of felloe, and height, and we will quote you price. If wanted with tire on them, give thickness of tire.

CRAY BROTHERS, CLEVELAND, OHIO.

Saves Figuring...

We have a book which you will find a time saver in your shop. You will not have to stop to figure out this or that dimension on a piece of work. Just refer to

Foden's Mechanical Tables

This book gives Circumferences of Circles by eighth inches up to twenty feet, weight of Rectangular Iron, Round and Square Bar Iron, Angle and Sheet Iron, and other miscellaneous tables. **CLOTH BOUND. PRICE, 50 CENTS.**

Sent to any part of the world postage prepaid.

American Blacksmith Company, DRAWER 974, BUFFALO, N.Y.

BUFFALO PORTABLE AND STATIONARY FORGES

Types and Sizes for All Requirements



No. 7 Bench Forge

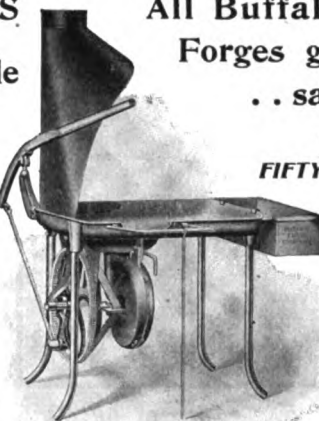
SIXTY TYPES AND SIZES OF Buffalo Portable Forges

Complete lines of Punches, Shears, Bar Cutters, Tire Benders, Tire Up-setters, Hand Blowers, Power and Hand Drills



No. 25 Blacksmith Out-door Forge

Write for Latest Catalogue Just Out



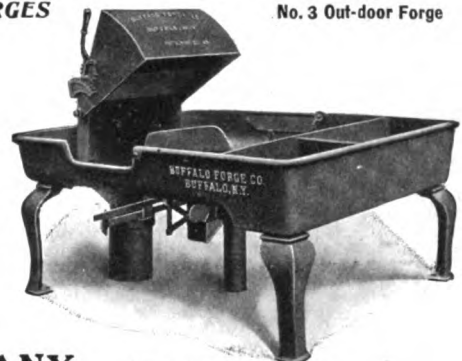
Old Reliable Blacksmith Forge No. 0.

All Buffalo Tools and Forges give the same . . satisfaction . .

FIFTY-EIGHT TYPES AND SIZES OF STATIONARY AND DOWN-DRAFT FORGES



No. 3 Out-door Forge



No. 03 D Stationary Forge

OUR GUARANTEE. The guarantee of the Buffalo Forge Company has always been: If any forge or blower is not as represented and perfectly satisfactory return AT OUR EXPENSE. That is why they have always been recognized as the standard of the world.

BUFFALO FORGE COMPANY

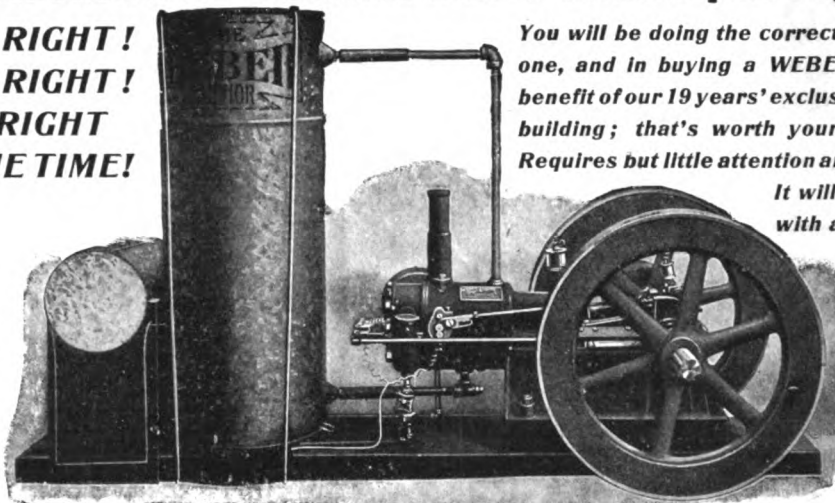
BUFFALO, N. Y.

Weber

More Weber Engines being used by Blacksmiths than all other makes put together

**BUILT RIGHT!
LOOK RIGHT!
ARE RIGHT
ALL THE TIME!**

Solid
Strong
Simple
and
Durable



You will be doing the correct thing to put in one, and in buying a WEBER you get the benefit of our 19 years' exclusive Gas Engine building; that's worth your looking into. Requires but little attention and small space.

It will last a lifetime with a little care.

Powerful
and
Economic
cal

The 2 1/2-Horsepower WEBER JUNIOR as it appears at work.

The Junior is shipped (crated) with all fixtures attached ready to set up and run, requiring no pipe fitting or connections.

Over 7,500 Weber Junior Engines now in use!

Our New Catalogue

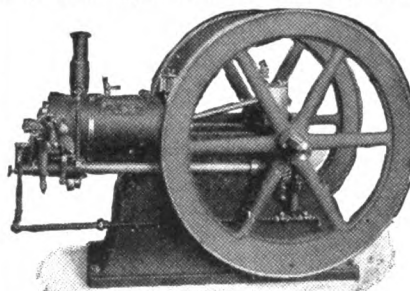
Just out—gives much interesting information. Over one hundred endorsements of the WEBER from blacksmiths and others.

**Every
Blacksmith
and
Wagon
Builder
should
have
it.**

FREE—Send Postal for it.

5 H. P. Webers

are being bought by blacksmiths all over the country. Just the engine for those who need more power than 2 1/2 horsepower. Have electric and tube igniters, gasoline pump, underground tank and latest improvements. Each engine critically tested and guaranteed perfect.



5 H. P. WEBER.

We Guarantee

all WEBER engines to be of the very best material and workmanship, and agree to replace any defective part, F. O. B., our own works, without cost for two years. We guarantee fuel consumption and interchangeability of parts.

**All sizes
built
up to
300
Horsepower**

Our nineteen years of experience goes with each "Weber."

Weber Engines operate on one-tenth of one gallon of gasoline per horsepower per hour.

Every Engine Sold is an Advertisement.

Every User of a WEBER is an Endorser.

GENTLEMEN:—I have a 2 1/2 horsepower Weber Gasoline Engine, and it is a dandy. I run a 12 in. x 2 1/2 in. emery wheel, a 12 in. polishing wheel for polishing plow shares and other work, a grindstone, a table for 14 in. rip and cut-off saws, a shaper which carries a 5 in. cutter head, a jig saw, a spoke tenoning and felloe boring machine combined, a No. 2 Bailey power drill, and I have just put in a power blower for four fires. This little engine will run all of these machines at once, except the shaper, which takes more power. It will run it and any other one of the machines. I also have a wood turning lathe. The engine takes off much of the hard work attached to our trade. I doubt if there is any better engine made for power than the Weber. It is safe and simple.

COFFEYBURG, Mo., April 19 1908.

S. G. MOONEY.

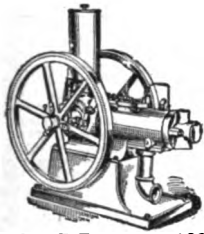
Weber Gas and Gasoline Engine Company

POST OFFICE BOX V 1114

KANSAS CITY, MISSOURI

THE MIETZ & WEISS Gas and Kerosene Engine

ADOPTED BY UNITED STATES AND
FOREIGN GOVERNMENTS.



Highest Award for Direct Coupled
Kerosene Engine and Dynamo,
Paris Exposition, 1900. Gold
Medal, Pan-American Exposition,
1901. Gold Medal, Charleston,
S. C., Exposition, 1902.

Burns Kerosene Cheaper
and Safer than Gasoline.
Automatic, Simple, Reliable.
For Pumping, Electric Light-
ing, Charging Storage
Batteries and all Other
Power Purposes.
Direct Coupled or Belted Dynamo
Sizes from 1 to 60 H. P.

A. Mietz, 128-128 Mott Street, New York.
SEND FOR CATALOGUE.

The Little Giant



GAS AND GASOLINE ENGINES

2 H. P. Vertical, 4 H. P. Horizontal. Either tube
igniter or electric igniter. Shipped mounted on
skids as shown in cut. Also equipped with pump-
ing attachments. Write for booklet describing full
line New Era Gas Engines from 4 to 80 H. P.

THE NEW ERA IRON WORKS CO.,
No. 63 Dale Avenue, DAYTON, O.

Trade Literature and Notes.

The Mansion House, situated at the
corner of Main and Exchange Streets,
Buffalo, inform us that they are well
equipped to take care of all blacksmiths
and others visiting the city at the time of
the coming convention of blacksmiths.
The hotel is most conveniently situated,
being only two minutes' walk from the
station.

We have received four new circulars from
Bertsch & Co., Cambridge City, Indiana,
cataloguing their rolls, punches and shears
with numerous illustrations of the same.

The Webster Horizontal and the Webster
Vertical engines for gas or gasoline, are the
subjects of two separate booklets of recent
issue. Both are of neat design. On page
16 of Catalogue J is mentioned a list
of "side lines" that may be opened up by
a blacksmith possessing an engine. These
catalogues may be had of the Webster
Manufacturing Co., 1075-1097 West Fif-
teenth Street, Chicago.

Do You Want

A nice gold fountain pen, one that is meant
for service?

Send us the names of two new subscribers
with \$1.00 for each one—and we will send you
a good fountain pen. Include your name as
one if not already a subscriber.

American Blacksmith Company

P. O. Drawer 974 - - - BUFFALO, N. Y.

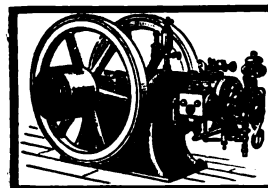
Bolster Springs

ALSO WAGON SEAT,
TRUCK AND PLATFORM SPRINGS



Sold by leading Jobbers, or write us

HARVEY SPRING CO.
RACINE JUNCTION, WIS.



"LAMBERT" GAS AND GASOLINE ENGINES.

Stationary and Portables, from
1 to 70 horse-power. Over 6,000 in
use. Twelve years on the market.

TRIED AND TRUE.

SEE PAGE 220

They are sure runners and no
trouble. We have prices that
are right. Write for our Free
Catalogue and Prices.

D. Lambert Gas and
Gasoline Engine Co.

ANDERSON, IND.

Hand Forged Butcher Knives

Ground, Tempered and all ready for the handles, either round or riveted, for 15 cents
each or \$1.50 a dozen. All sizes from 5-inch to 8-inch. These Blades are made from
Sanderson Steel and warranted. Will replace any imperfect knife with two new ones.
Handles all ready to put on, one cent each.
Hand Forged Razors, ready to use, 40c. each; Pocket Knife Handles, in great variety, 10c.
Try a sample. Hundreds of Smiths are using these blades and make money and
friends selling them. Liberal discount in quantities. Address

WOODWORTH KNIFE WORKS, - NUNDA, N. Y.
ESTABLISHED IN 1876.

Blacksmiths Wanted

To represent and introduce The AMERICAN BLACKSMITH in every city and
county in the United States. Liberal returns for slight efforts.

Send postal for particulars. Let us tell you how we help our agents
Do you want to represent us? Address

American Blacksmith Company

P. O. Box, 974, Buffalo, N. Y.

The Keystone Forging Company, North-
umberland, Pa., have sent us their cata-
logue of 180 pages. Fifth wheels are their
specialty, and the number and variety of
these herein catalogued are surprising.

The Frank M. Watkins Mfg. Co., Cincin-
nati, Ohio, sent us their 28-page catalogue,
with engravings and descriptions of their
gas and gasoline engines and special pump-
ing machinery. This catalogue is a neat
and attractive one.

Prentiss Vise Company, 44 Barclay
Street, New York, U. S. A., have just sent
us their "Catalogue X," showing the wide
range of vices they manufacture. Inter-
esting descriptions and illustrations with
complete price lists make this folder a very
useful one to the buyer.

Prof. J. D. Fitzgerald, of 4923 Cottage
Grove Avenue, Chicago, Ill., sends us a
table of recipes for treating corns, thrush,
nail wounds, shoe boils, old sores, burns
and scratches by the use of his "Sure Cure."
Full details may be obtained on application
to him.

The Byrne Patent Five-Bolt Wrench and
Clamp, manufactured by Byrne & Ziegano,
Sharon, Wis., whose advertisement appears
on page XXIII of the AMERICAN BLACK-
SMITH, is the best designed for taking off
and replacing nuts on tire-bolts. They are
sold by all leading jobbing houses in the
United States, also by the manufacturers.

Two neat little folders from the Lennox
Machine Company, Marshalltown, Ia.,
describe the Lennox Gasoline Engines.

The Nicholson File Company of Provi-
dence, R. I., sent us their neat little cata-
logue of 58 pages and circulars describing
their 3,000 varieties of files and tool special-
ties.

Another engine book has arrived from
the Hartig Gas Engine Co., 14 Commercial
Street, Newark, N. J. It contains 23 pages
with illustrations of the Hartig engines and
the "Dandy Ice Breakers," also manufac-
tured by the firm. A large number of
testimonials are added which serve to voice
the opinions of users of these engines and
machines.

The Sideweight Horseshoe Co., Hartford,
Conn., are calling special attention to their
"Boss" Toe Weight and "Hartford"
Sideweight Shoes, which are especially
valuable in shoeing for irregularities of gait,
and which are claimed to cost less in money
and labor than a hand-made shoe. They are
made in four sizes and three weights, and
a sample pair will be mailed to any one,
postpaid on receipt of 50 cents.

The Geo. E. Watson Company, of 108
Lake Street, Chicago, Ill., are issuing
special price lists of carriage and sign
painters' supplies which are of especial
value to any one having to do with painting
of vehicles, and are also offering to send
without charge sample book of coach colors,
and sample of steel wool, which they are
handling. See their advertisement on page
XII.

The Pontiac Hardware Specialty Com-
pany, Box 102, Pontiac, Mich., are placing
upon the market a very ingenious device
termed an Extension Axle Nut, which takes
up the wear and slack from any buggy.
These axle nuts are to prevent the wobbling
of wheels when the bearings begin to wear,
and save the expense of putting in new
boxes. Special inducements are offered to
agents and to blacksmiths to recommend
and push these axle nuts.

METAL SHINGLE ROOFING...

With Montross Telescope Side-Lock is the best roofing in the world for house or barn. Storm proof. Easily applied. Catalogue, Prices and Testimonials free for the asking.

Montross Metal Shingle Co., Camden, N.J.

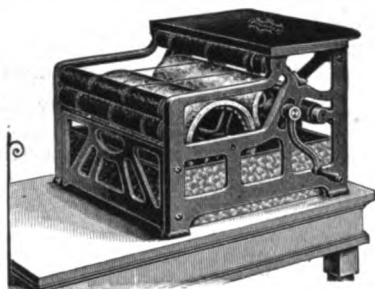
"The Australasian Coachbuilder & Wheelwright."

A Monthly Illustrated Technical Journal circulating amongst Coachbuilders, Wheelwrights and Blacksmiths throughout the Commonwealth of Australia, New Zealand and South Africa.

Advertising and subscription rates on application to

J. E. BISHOP & CO.,
65 MARKET STREET,
Sydney, Australia.

Copy your Letters on the New ROTARY COPYING PRESS



Copies made instantly on loose-sheet tissue. Shipped on trial. Price, \$20.00.

The P. L. Machine Company,
MUNCIE, IND.

THE LITERARY DIGEST

"All the Periodicals in One."

An illustrated weekly magazine with interesting information adequately covering all the chief subjects of human interest, as selected, translated, and digested from the world's choicest periodical literature.

THE LITERARY DIGEST

\$3.00 a Year. Single Copies, 10c.

FUNK & WAGNALLS CO.,
New York.

Hausauer, Son & Jones

PRINTERS, ENGRAVERS

BOOKMAKERS

253-257 Ellicott Street, Buffalo, N. Y.

Complete Equipment for the production of Machinery Catalogues, Stock Farm Catalogues, College Annuals, also Catalogues in Foreign Languages, promptly, accurately and tastefully.

Plow Lay Welding Machine and Leveling Block Combined



An invention to provide a novel, simple, efficient and economical method of welding and shaping all kinds of plow shares. Indispensable to every Blacksmith. Guaranteed to give satisfaction. If not satisfactory, money refunded. Send for Illustrated circular and prices. It tells the rest.

G. S. STROM, Whiterock, Minn.



DEATH TO HEAVES
Guaranteed
Newton's Heave, Cough, Distemper and Indigestion Cure. A veterinary specific for wind, throat and stomach troubles. Strong recommendations. \$1 per can. Dealers, mail or Express. Newton Horse Remedy Co. 131 Toledo, Ohio.



\$60. Back-gear screw cutting foot or power LATHES, made in large lots with special tools swing ten inches over bed. Our ten years of manufacturing small lathes enables us to make a low price on a high grade tool. Write for guarantee, circulars and discount.

**Carroll & Jamieson
Machine Co.**
BATAVIA, - - - OHIO.

Not the CHEAPEST but the BEST



The Melvin Spoke Puller

makes spoke pulling an easy task, a pleasure even. Absolutely guaranteed in every respect. WHY NOT write for prices? It costs but a penny, and may save you much time, labor and money.

J. G. MELVIN, Martinsville, Ill.

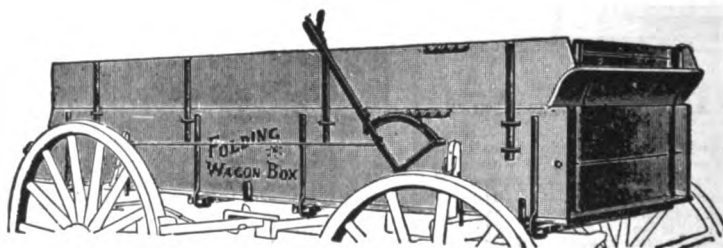
PROPRIETORS.
WM. WILHELM, A. R. KOEHLER.

HALF TONE PROCESS
WOOD & FINE WAX
ENGRAVING
ZINC ETCHING
ELECTROTYPING

GIVE US A TRIAL
OUR FACILITIES ARE OF THE LARGEST

**Buffalo
Electrotype &
Engraving Co.**

Do You Build Farm Wagons?



THEN YOU ARE INTERESTED in the FOLDING WAGON-BOX.

Built in separable parts which firmly and tightly interlock, making a simple, practical, strong and durable farm wagon bed which a boy can handle—put it on or off the running gear—easily and quickly, any place. Easily and compactly stored in very small space when not in use. Its simplicity and convenience appeal to all classes of farmers. (See description in February AMERICAN BLACKSMITH.)

With the special irons any wagon maker can build this knock-down box, right in his own shop, easily, quickly and cheaply, with the same wood-work as is used in the old-style box, of any pattern or dimensions to suit the trade.

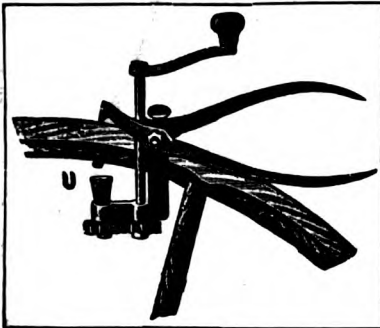
PRICE OF IRONS \$1.75 PER SET; \$10 PER HALF DOZ. SETS. FREIGHT PREPAID ON DOZ. SET ORDERS.

FOLDING WAGON BOX CO., : : Haverhill, O.

BEST TIRE-BOLT WRENCH AND CLAMP IN THE WORLD

Highest Recommendations from Users
and Sellers—Inquire of Either ♪ ♪ ♪

Machine can be used to best advantage by laying wheel flat on horses
or barrel, and follow as fast as nut is removed, without moving wheel.



**Byrnes
Patent
Tire-Bolt
Wrench
and
Clamp**

PRICE \$3.00
We Pay Freight

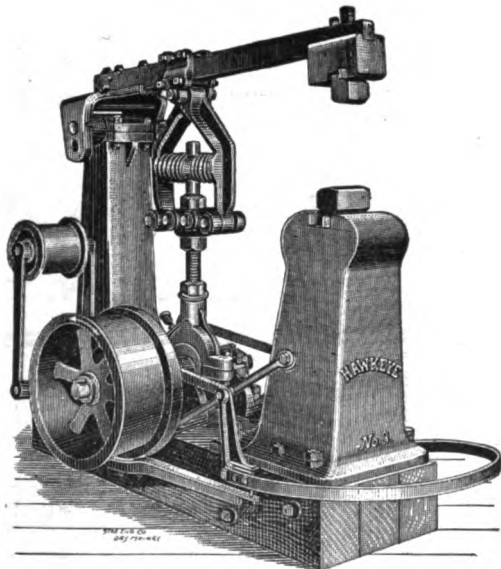
Manufactured by
Byrnes & Ziegans
SHARON, WIS.

**SOLD BY ALL LEADING JOBBERS AND
BLACKSMITH SUPPLY HOUSES ♪ ♪ ♪**

If your supply house does not sell them, send
direct to the manufacturers. Cash with order.

EVERY MACHINE FULLY WARRANTED

THE HAWKEYE POWER HAMMER



THESE hammers are built in two sizes and they meet all the
requirements of the blacksmith and wagon maker and are
guaranteed to give satisfaction for plow work, general
repairing and heavy forging. The work can be done more
rapidly and much better than by hand and the hammer will
pay for itself in one season. ✂ ✂ ✂ ✂ ✂

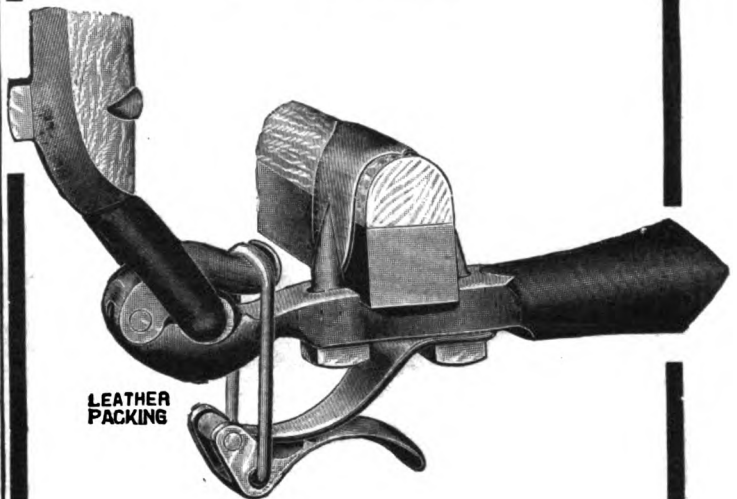
For Prices and Full
Description address

**THE HAWKEYE TAMA,
Manufacturing Co. IOWA**

THE BRADLEY SHAFT COUPLING

BALL-BEARING

The cut shows the new style Bradley Ball-
Bearing Shaft Coupling with Step
Shank Extension.



No. 82—For axles $\frac{3}{4}$ to 1 inch

No. 92—For axles 1 to $1\frac{1}{4}$ inch

These Couplings are made en-
tirely of STEEL, have been
thoroughly tested, are warranted
in every particular, and have the
well-known BRADLEY quality.
Orders can be filled same day
received. We solicit your favors.

C. C. Bradley & Son
SYRACUSE, N. Y.



HAY-BUDDEN Solid Wrought ANVILS

THE GOLD MEDAL ANVIL

HIGHEST AWARD

OMAHA, 1898

PAN-AMERICAN, 1901

WARRANTED

Every genuine "Hay-Budden" Anvil is made of the best American Wrought Iron and faced with best Crucible Cast Steel. Every genuine "Hay-Budden" Anvil is made by the latest improved methods. < < < < <



PATTERNS—Regular Blacksmith, Farriers', Farriers' Clip Horn, Plow Makers', Double Horn, Saw Makers', Instrument Makers', Chain and Axe Makers', Etc., Etc., Etc. Send for Descriptive Circular. < < <

WEIGHTS FROM 10 TO 800 LBS.

Experience has proved their worth and demonstrated that "Hay-Budden" Anvils are Superior in Quality, Form and Finish to any on the Market.

OVER 80,000 IN USE

HAY-BUDDEN MANUFACTURING CO.

254-278 NORTH HENRY STREET,

BROOKLYN, N. Y.



AMERICAN BLACKSMITH

BUFFALO
N.Y. U.S.A.

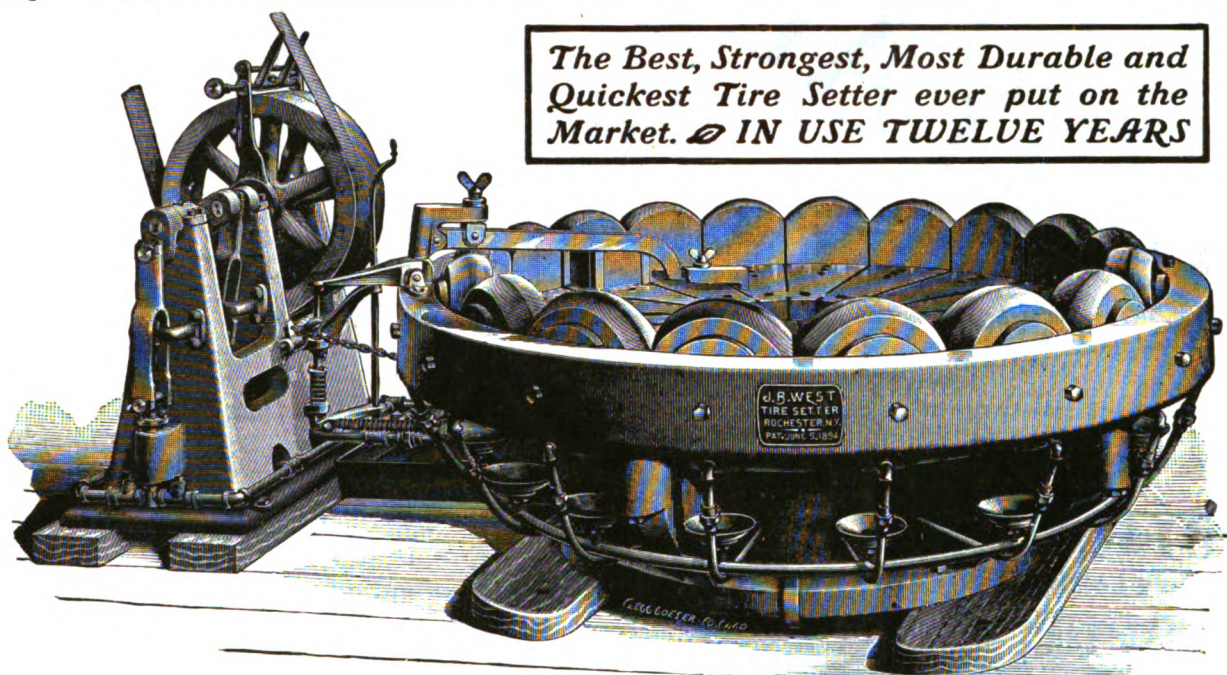
A PRACTICAL JOURNAL OF BLACKSMITHING

SEPTEMBER, 1903

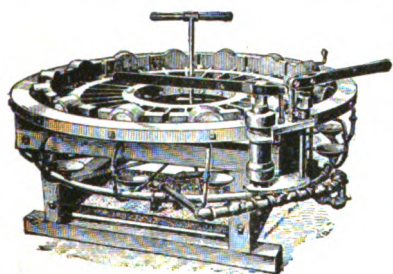
\$1.00 A YEAR
10¢ A COPY

THIS represents our Power Hydraulic Tire Setter, which we make in various sizes suitable for handling tires from 9 inches wide down to $\frac{3}{4}$ inch. Used in nearly all European countries, India, South Africa and other remote points, and by hundreds of the best known manufacturers and repairers in the United States, Canada and Mexico. * * * * *

The Best, Strongest, Most Durable and Quickest Tire Setter ever put on the Market. IN USE TWELVE YEARS



THIS cut shows our Hand "Hydraulic Junior" Tire Setter, designed for use by manufacturers and repairers who have no power or cannot afford to put in one of our large machines. Not so heavy as the power machine, but embodies many of its principles, and worth many times its cost where there is work for it to do. Encircles the wheel and tire, distributing the compression around circumference—the only proper way to set a tire cold. The founder of our Company invented, patented and manufactured "edge-grip" machines when the "West" Tire Setters were the only ones on the market, and if the principle had proved right we should still be making that kind—but we are not, we have something better. Write us and we will tell you more about it. * * * * *



CAUTION. Having brought suit for infringement against the National Machine Co. of Keokuk, Iowa, we take this means of reminding the trade that users of infringing machines are equally liable with the manufacturers : : :

The West Tire Setter Co.

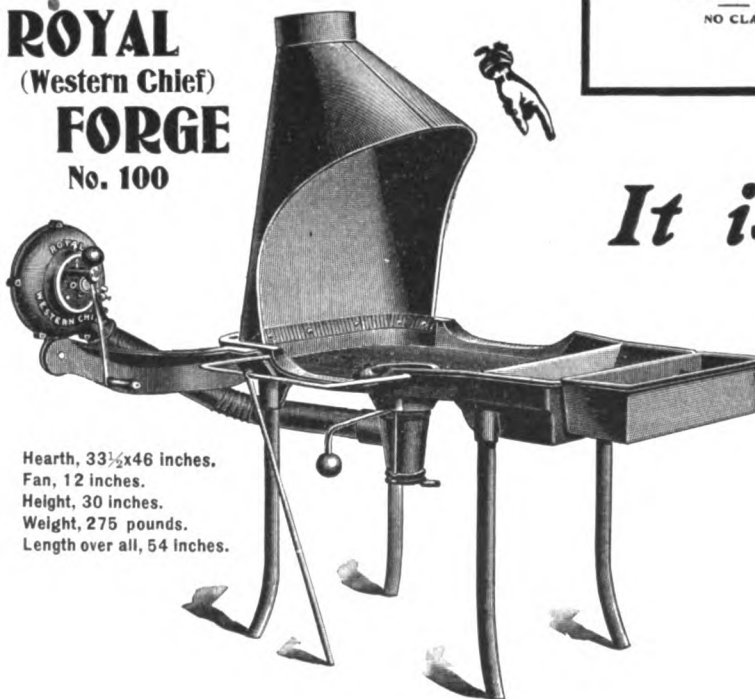
ROCHESTER, N. Y.

ROYAL

WESTERN CHIEF

ROYAL
In Every
Sense

ROYAL
(Western Chief)
FORGE
No. 100



Hearth, 33½x46 inches.
Fan, 12 inches.
Height, 30 inches.
Weight, 275 pounds.
Length over all, 54 inches.

Reliable
Our Choice
Your Choice
America's Choice
Leads Them All



The
ROYAL FIRE POT
NO CLAY

HANDSOMEST: Because its constructive design is symmetrical, attractive and beautiful.
SIMPLEST: Because fan case and column stand (2 parts only) is about all there is of it.
BEST: Because made of the best material, by the best workmen and best mechanical experience that can be obtained.

SUPERIOR POINTS.

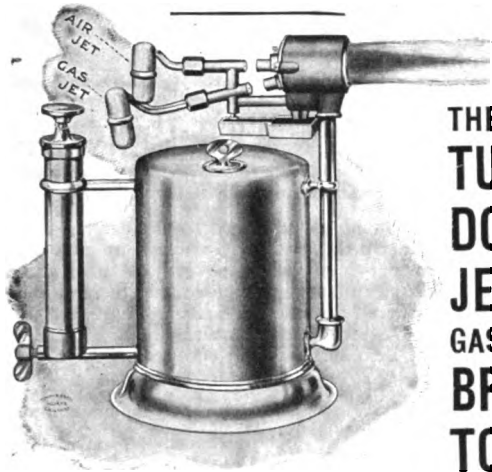
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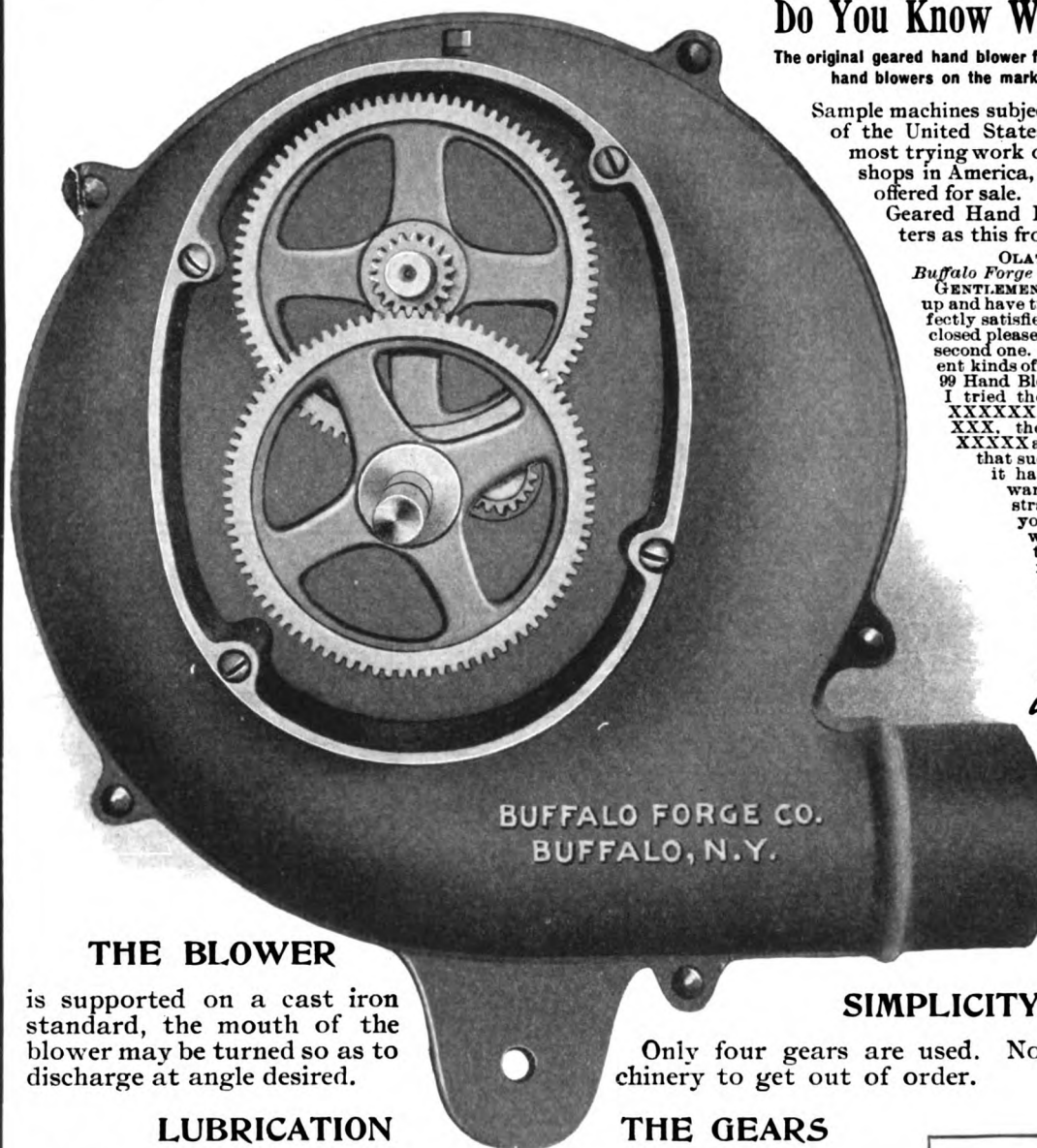
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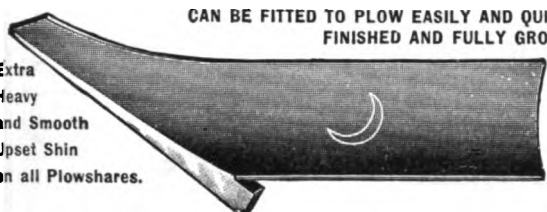
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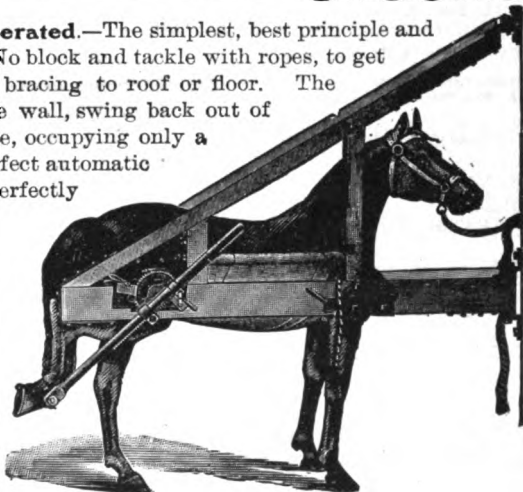
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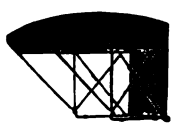
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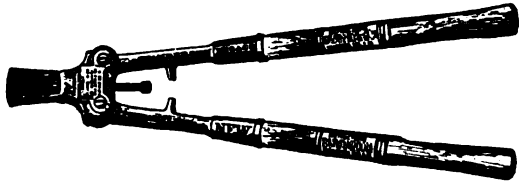
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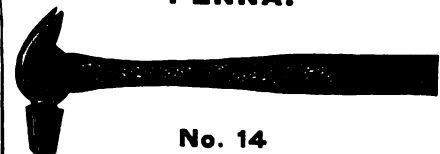
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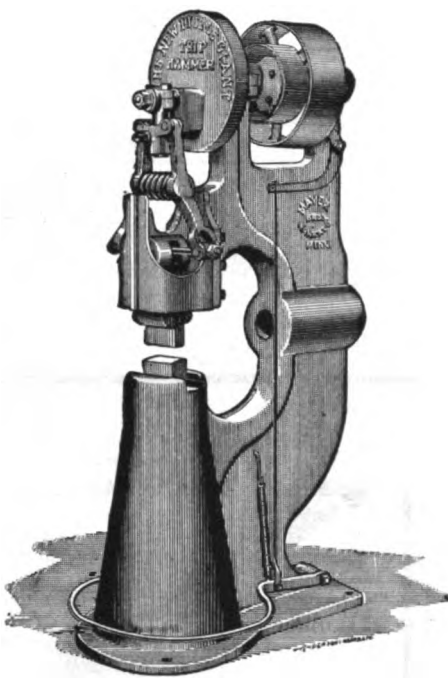
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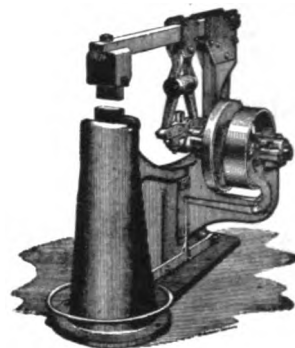
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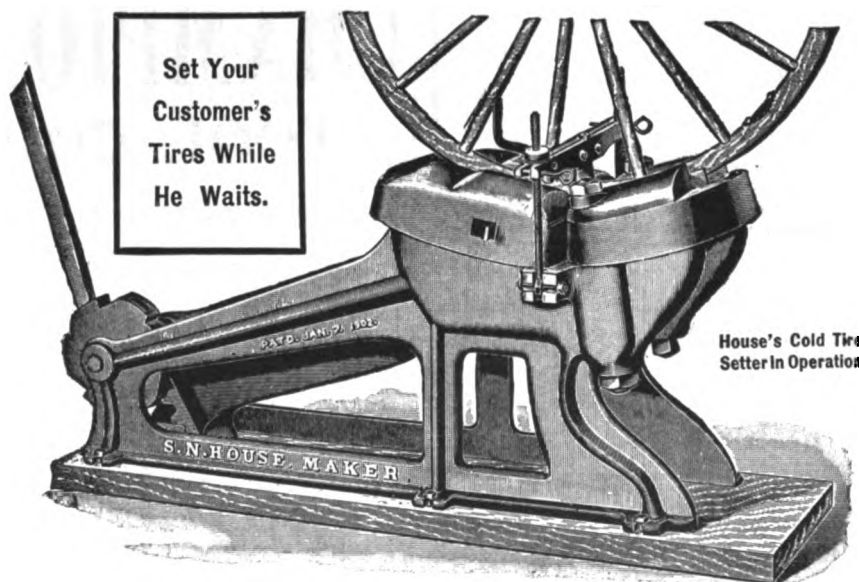
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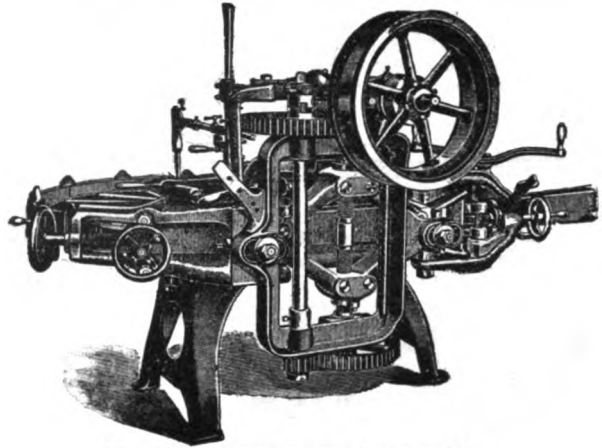
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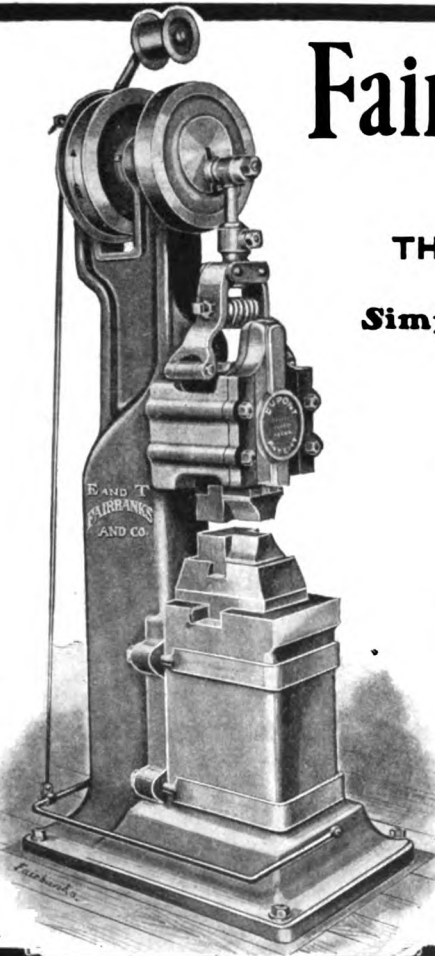
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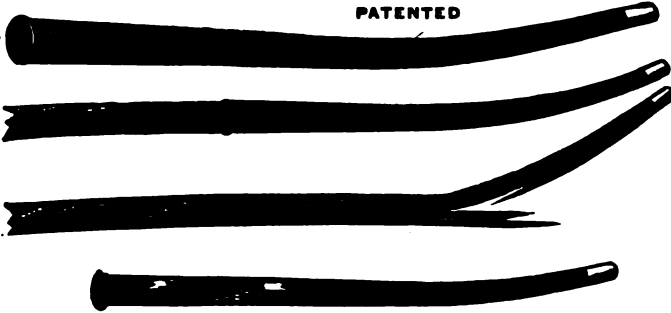
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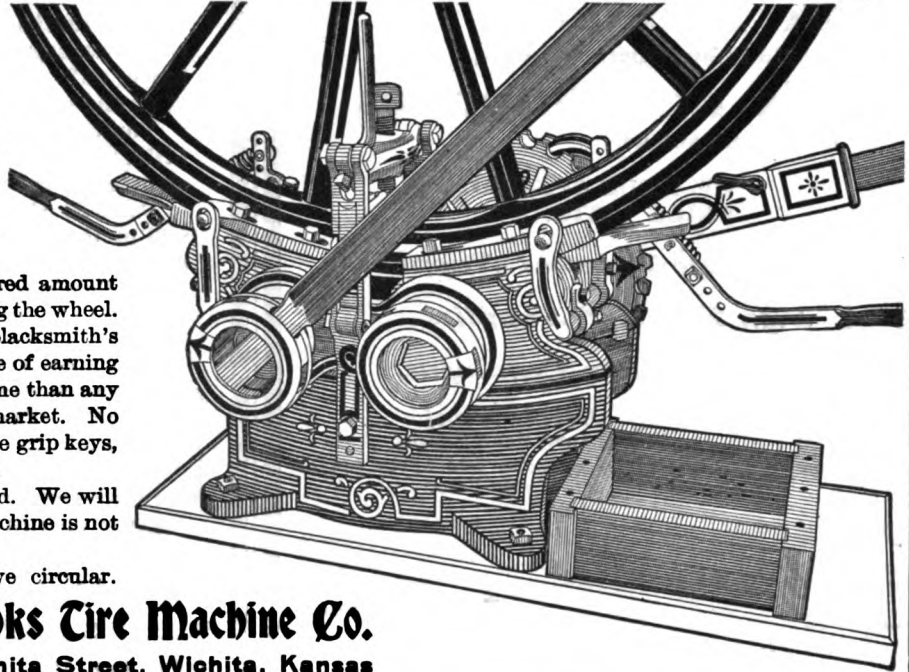
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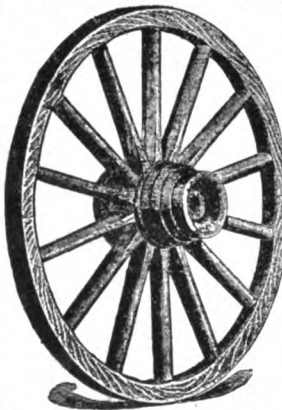
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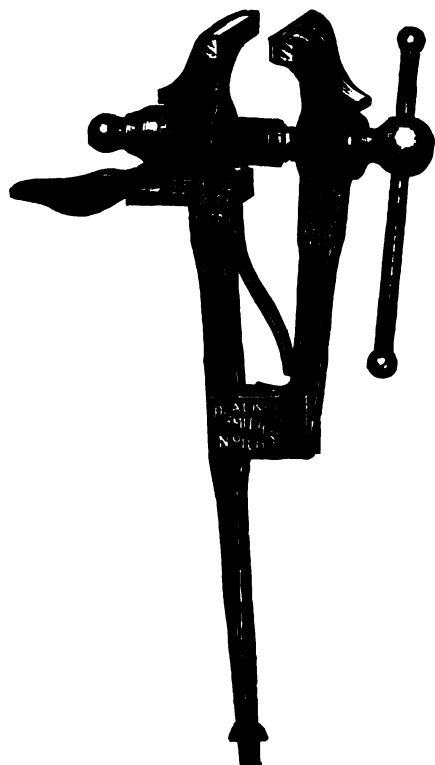
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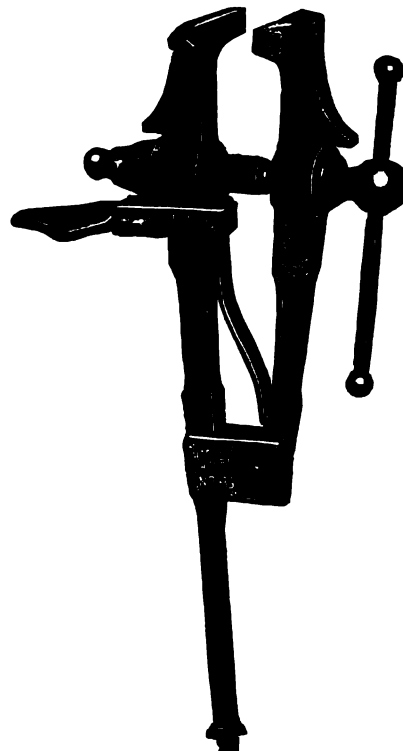
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THE AMERICAN BLACKSMITH

A PRACTICAL JOURNAL OF BLACKSMITHING.

VOLUME 2

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Steam Versus Gas as Power.

A great many comments have appeared in these columns from time to time referring to the relative advantages of steam engines and gas engines as power units for the blacksmith. This is a very interesting topic, and one which vitally concerns all craftsmen who are thinking of putting any form of power into their shops for improving their conditions. We should like to hear from any of our readers who have had experience of either side of the question, or better still, from any who may have used both kinds of power.

In the Interests of Subscribers.

When a paper claims to be published for a particular class of readers, it should, of course, have the interests of those readers at heart, and should furnish them with such information and reading matter as they desire and pay for. Too many trade journals make the advertiser instead of the subscriber their primary consideration. This is often shown by palming off as something new and interesting descriptions of machines which have been on the market for ten years, thus catering to the advertiser in place of the subscriber.

The publishers of THE AMERICAN

BLACKSMITH desire to put out a paper in the interests of blacksmiths and wagon makers of all classes, a paper which they can value for its high standard of printing and reading excellence. Suggestions for improvements are always highly appreciated. How can THE AMERICAN BLACKSMITH be bettered and made of greater value to you?

A Realistic Poem by One of Our Folk.

The poem on page 230 of this issue was sent in to us by a subscriber who has seen service in many different branches of blacksmithing work. We publish it because it is so true to the conditions existing in many places. How often we hear of blacksmiths selling out and quitting the business because of poor prices or slow pay. There would be fewer skilled workmen giving up the business if they were able to collect their pay for all the work they did. The farmer mentioned in the poem is a familiar customer to every village blacksmith.

And yet there may have been other reasons influencing the smith in the poem to give up the trade in despair. In the first place, no smith can expect to achieve any great measure of success in his daily work if he is so ignorant of his letters that he cannot spell common words of one syllable correctly. In these days of our splendid public school systems, no smith, especially of the younger generation, has any excuses for such gross illiteracy. Success at smithing demands that the man be able to read and keep up to date as well as to command and hold a position of respect in his community. Fortunately, however, such smiths as he of our poem, are rare, and growing scarcer each day.

Another point is that this smith was perhaps too easily discouraged. The man who is ready to give up at the first obstacle, never wins success in any station of life. Perseverance and persistence are two of the finest words in the English language. Blacksmithing is one of the oldest and best of callings; it is

today affording thousands and thousands of craftsmen a good honest living and more. It is with sincere regret that we hear of many cases where smiths have "quit the business." This is not the fault of the trade, but more often lies with the man himself. Many unfavorable conditions can often be corrected. The trouble with slow payers and bad debtors can be largely avoided by care and tact on the part of the craftsman, combined with discretion as to whom he trusts and for how much. It is far better to do less work and get paid for it all, than to do much and lose a considerable proportion of the pay. A good workman with a good head need never despair of blacksmithing bringing its proper returns. In the duel between the Shannon and Chesapeake, Lawrence said, "Don't give up the ship." In life's struggle the smith's motto might well be, "Don't give up the craft."

The Man Who Gets Rich.

Nine out of ten of the workmen of today are so busy with schemes to "make dollars out of wind," that they have no time to look after their trade. Their craft is merely a drudgery and a convenience whereby they may live from day to day until they strike a lucky "invention," patent it and become millionaires.

The man who is a blacksmith today, tomorrow, maybe, behind a grocery counter and next week working on a farm, can never hope to make a success of anything. Flitting from task to task, he grumbles that he never gets a chance, that Fate is against him and that there is no justice in the world.

What the world wants is earnest, expert workers, men who toil patiently for the love of the thing they are doing and for the sake of accomplishing something worthy. For such there is always a place and a good living. There is a dignity in first-class work that raises the worker to the rank of experts, however humble his calling, but the botch-worker is the tramp of any trade.

The men who have made millions have

been men who had brains and used them in working out their own original ideas in the every-day affairs of life. Perhaps the millions came at a stroke. The world calls it a "windfall," taking no account of the earnest, concentrated effort that made the stroke a master-stroke and a final one. The money-making genius is invariably the man who is capable of first-class things.

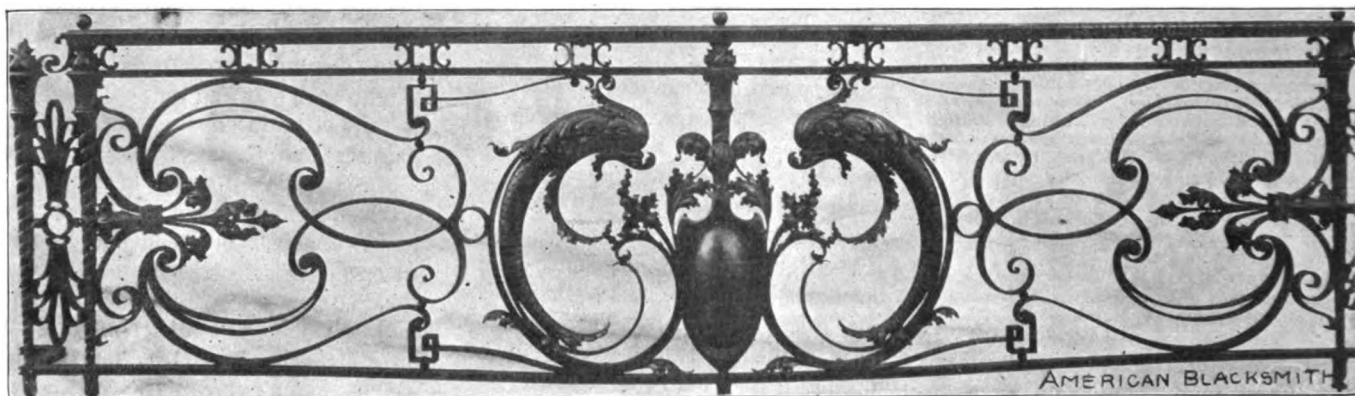
Dragons in Ornamental Pieces.

Exceptionally fine is the design in wrought iron reproduced herewith. The scroll appears in combination with geometrical forms and foliage effects, but the motif of the design lies in the grotesque dragon-like monsters supporting the central shield. These dragons may be adapted to so many designs in

bending. This will obviate kinks, unavoidable by all tire benders in which the top roller does the bending, and particularly if the tire is drilled or punched before bending.

A wheel plate, or "template," or "trueing plate" is something not found in every shop, but a very useful tool. It is large enough to lay any wheel on. The center of the plate is open, and under it is a basin for water. The plate may rest on a raised platform convenient for the workmen to put the left foot or hand on the wheel and hammer the tire with the hammer in the right hand, so as to get the tire snug all around against the rim. The plate being perfectly true will show whether the wheel is twisted or not. When the tire is in place it is turned up on edge and the tire cooled in the cen-

practicable, the woodshop should adjoin the smith shop and be connected by a door-way large enough to permit of the passage of a vehicle. In small shops the wood shop and smith shop often occupy the same room, one at either end of the room if large enough. But it is an advantage to have the wood shop capable of separation by a partition and sliding door. In a repair shop convenience in getting at a vehicle without moving it is a matter to be studied. At the same time if it must be moved, as often happens to the wood shop or other department, it must be done with as little trouble and disarrangement of the shop as possible. The plan of the shop and the method of entering each department from the central receiving room, elevator or runway has impor-



PART OF A RICHEY, BROWNE AND DONALD BALUSTRADE, COMPRISING AN EFFECTIVE DRAGON DESIGN IN WROUGHT IRON.

iron work, and give such good results in this sombre metal that it is worth the while of the amateur designer to do some studying in this line.

The first engraving is of a cast iron railing on a balcony at residence No. 15, East 38th Street, New York City, of which Cyrus L. W. Eidlitz is the architect. The second shows the design in detail. This piece is the work of Richey, Browne & Donald, Architectural Iron Workers, Long Island City, N. Y.

Kinks and Conveniences in the Wagon-Shop.—5.

BY D. W. M.

A tire bending machine and an up-setting machine are tools that are absolutely necessary to a tire fire. These are frequently combined in one machine, but we prefer to have them separate as being more effective. But where shop room is limited, economy of space is necessary. Where power is employed a machine that will bend four tires at once is preferable to any other. The rollers should be arranged to grip the tire on entering and let the further roller do the

tral basin. Where there is no such trueing plate, the wheel is laid on trestles when putting tire on and the tire is cooled in the usual water tub, or sometimes an oblong rectangular basin is made in the floor for that purpose.

We will not speak of the other forges, if any, because their equipment will vary with the work required.

The boxing machine is commonly found in the wood shop, because usually operated by a wood worker. But it is a great convenience to have it in the smith shop near the tire fire. But this means the use of such a wheel boxer as will avoid the use of a wood worker's tools, and has a bit capable of cutting out a hub to fit any box. Such machines are made and can be operated either by hand or power, moreover the box will drive in true and require no wedging with such a machine. There are cases, however, where the wheel must go to the wood workers.

The connection between the smith and wood shops is so close and the passing of work back and forth between them so frequent that wherever

tant bearings. A shop should have conveniences for receiving and shipping new work as well as for looking after repair work, so that a repair job when finished will have a place to stand and harden, and be kept clean and sightly. In the case of an old job taken for a new one, and which must be rebuilt and then sold, a decent wareroom is necessary.

Adjacent to this wareroom should be a wash platform on which a vehicle from any department may be run and cleansed. Otherwise the painter is called from his work with a bucket of water and sponge to wash a carriage. Even if the painter should be the only man in the shop who knows how to wash a carriage properly, there should be a platform with water trough, hydrant or pump, and drain.

How to Start a Gas Engine.

BILLY BUNTZ.

To the uninitiated, the starting of a gas engine is quite a trick, while not a few who have engines are sometimes troubled by the engine "balking" like an unruly horse. Should this occur while the smith has company or is endeavoring to show a patron or

prospective customer the merits of a gas engine, it naturally gives a wrong impression to the visitor, who may remark, "I don't want one of those things around me!"

The starting of a gas engine is a very simple matter when it is done the right way, while to try to start one without first having read the instructions or without any previous experience with engines of this class, not infrequently causes the smith to say words derogatory to the builder of "so infernal a machine." In fact, instead of using adjectives of meritorious praise he may become so agitated as to employ those of strong denunciation. Should he be agent for the engine, as well as operator of it, the effect on customers or future trade can readily be imagined. "Condemned by the agent," they will say, which has the same effect as giving a dog a bad name, and necessitates an endless amount of persuasion on the part of those who understand the operation of gas engines to assure a customer that the engine in question is as good as any, were it handled properly.

"Simply give the balance wheel a turn," is a common direction, and really that's all that's necessary, yet the builder assumes that the operator will take at least sufficient interest in his engine to look into the fundamental principles which cause the wheel to turn and transmit power, as it is only by understanding these that the smith can handle his engine easily should it "balk"; otherwise he may have unnecessary trouble and create an endless amount of hard-feeling should he be denunciatory. In this connection, the experience of one Dorkins is cited:

"I got an engine to run my shop," he explained, "and tried to start it in every way I could think of, although it appeared to be so simple, I didn't read the instructions, as I knew instinctively that it was simply a matter of turning

the balance wheel. That's about all I did know, however, and after turning until I was nearly exhausted, I was mad, and wrote for the agent.

"'What seems to be your trouble?' says he, without even giving the engine a look.

"I told him; then he took my ten year old boy over to the engine, and said:

"'Turn on the gasoline, Johnny,' pointing to the valve—at the same time asking me how trade was and saying he thought I had a nice line of tools for catching custom; while I thought he ought to worry a little about

it may be removed when the engine has been started. On an engine of medium size, the balance wheel is sufficiently large to allow the operator to grasp the spokes. To start an engine with a fair-size balance wheel, turn the wheel ahead or to the right until the connecting rod is at the end of its stroke, likewise the piston; then quickly reverse the wheel, *i. e.*, turn it back to the left—thus compressing the gas which had been drawn into the cylinder by the outward stroke of the piston, and when the crank is at or near the inner dead center, trip the igniter by hand, thus igniting the compressed gas and forcing the piston forward on its power stroke. A self-starter is used on engines of considerable power—say 15 or 20 horse. It is simply a little pump attached to the cylinder and operated like a bicycle pump, having volume sufficient for supplying the cylinder with a charge which, when ignited, will force the piston forward.

Little trouble is ever experienced in starting a gas engine where the operator has sufficient judgment to "look beyond the balance wheel," as there's where the

trouble is sure to be—usually some trivial thing, such as the feed pipe being clogged.

Talks to the Jobbing Shop Painter.—6.

M. C. HILLICK.

Movable Body Rack and Seat Rack.—Shop Truck.—Rubbing Deck.—Gear Suspending Device.

By permission of Ware Bros. Company, publishers of the esteemed *Carriage Monthly*, the writer is able to show two interesting and almost indispensable labor-saving devices for the carriage paint shop, namely, movable seat rack (See Fig. 13) and movable body rack as shown in Fig. 14.

In the shop where much moving of work is necessary, these utensils cannot well be omitted from the list of shop tools. The illustrations tell their own story and explain concisely how the

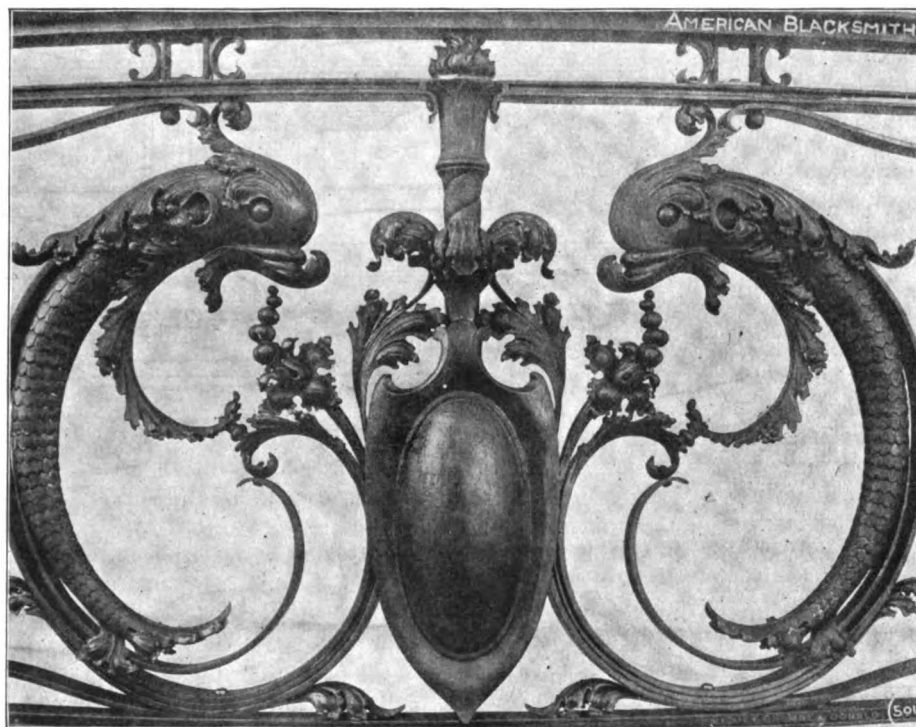


Fig. 2. DETAIL OF DESIGN IN WROUGHT IRON.

getting the engine started. But he didn't.

"'See any gasoline in there?' he asked.

"'Don't 'pear to be any,' said Johnny, who had the throttle wide open.

"'Have to take off the feed pipe,' he continued, 'and run this wire through it,' and Johnny poked out a straw an inch long, and the gasoline just spurted.

"'You must strain your gasoline,' he warned me, then said to Johnny: 'Give the balance wheel a turn'—and do you know, that engine started as easily as a boy rolling off a log. I felt mighty ashamed, while the agent simply said I should read the instructions and 'use my head,' remarking as he left, 'That kid of yours is a bright boy.' "

For use in starting the balance wheels many small gas engines have cranks similar to those on grindstones, although

devices are constructed. No well-regulated paint shop is quite complete without a truck for conveying carriage bodies, and, if necessary, running parts, from one part of the shop to another. Such a truck may be converted to a variety of uses, and, to enable our readers to form an opinion along the line of constructing such a truck, attention is called to the one herewith shown (Fig. 13). Much has been said and written in connection with paint shop conveniences relative to rubbing decks. Not a few illustrations have shown the rubbing deck made with the canal and drainage existing in the centre of the deck, the slant beginning at both sides and converging to the centre. With this style deck it is practically necessary for the workman to labor more or less in the hollow of the deck where water is quite sure to accumulate. He is forced to work upon two distinct grades, which is not comfortable. In Fig. 16, herewith, is shown a deck of one grade with the drainage canal at the extreme outer edge of the deck, and the drainage pipe running back under the deck and thence leading out of the building. This, on the whole, is the most convenient deck to work upon, and insures a good clean drainage with no water accumulating where it is necessary to work. While a cement or asphalt deck is best, a good, serviceable one fit to wear for a long time may be made of hard wood. Proportion length and width to size of shop. Locate it where plenty of good light is to be had, equip it

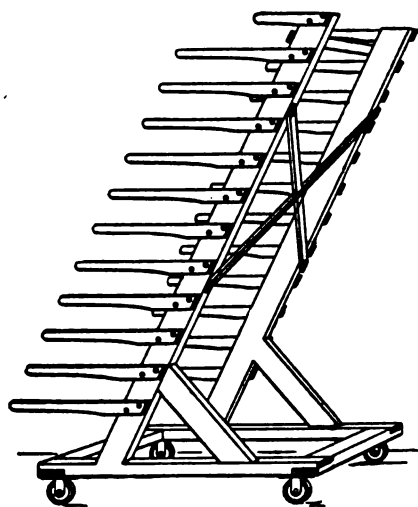


Fig. 13. A CONVENIENT FORM OF MOVABLE SEAT RACK.

with a strong bench for holding the various tools and articles to be used, and provide a couple of barrels cut and devised as shown in a former paper of this series.

Another device for utilizing space in a small paint shop where, at certain sea-

sons of the year, room is at a premium, is the double floor or platform. The construction of such a platform depends, of course, upon the height of the ceiling, but where the ceiling is of fairly good height and there is plenty of light in the apartment, the platform will be found

simply screwing them into the wood or by running them through the timbers and attaching washer and nut. Then into each of four screw eyes placed at proper spaces to suit the regulation size of gear, hook on the axle loop, and when the gear is freshly varnished let two

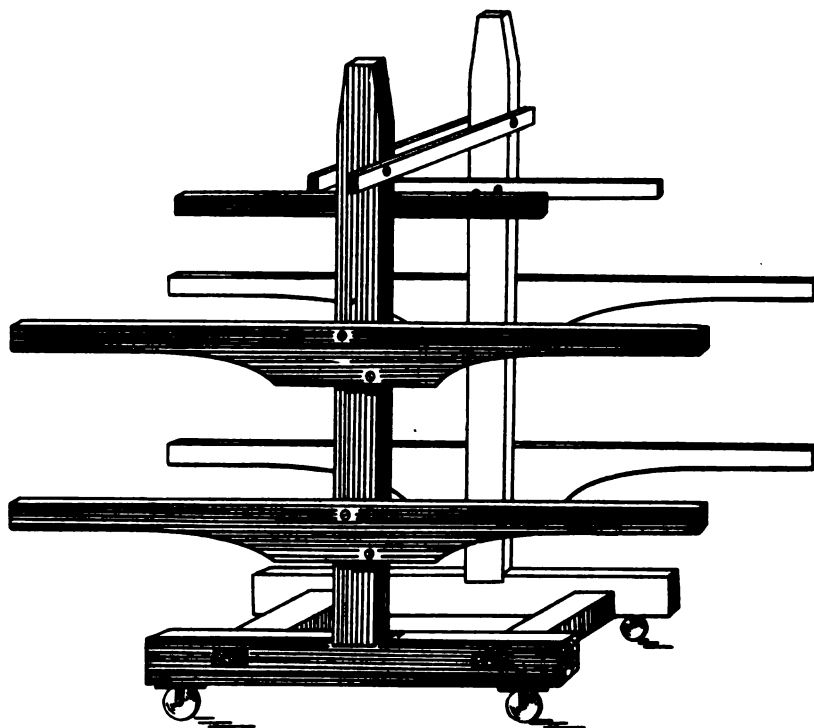


Fig. 14. A MOVABLE BODY RACK FOR THE PAINT SHOP.

invaluable. Construct the staging or platform so that the workman can walk upright and work handily underneath it. If any contraction of space is necessary, arrange to have it between the platform and the room ceiling. On such a platform or double floor, wheels and shafts may be stored, and during the busy season sanding and leading of wheels, etc., may be carried on.

The writer for some time worked in a Central New York carriage factory, where a platform of this kind was used, and a great mass of wheels were painted and stored thereon, and the quarters were not at all bad for temporary working purposes. A good many crowded country paint shops could be made more easy to work in, and have their capacity for getting out work considerably increased by the installation of a second floor in the paint room.

Another device for economizing space in the shop, and more especially in the varnish room, is the axle loop shown in Fig. 17, by the use of which one carriage gear may be suspended below another until the space from floor to ceiling is filled. In the ceiling joists insert screw eyes of large size and fasten them by

workmen, one standing on each side of gear and grasping an axle arm in each hand, lift the gear up and swing axle arms into the loops. These loops should be provided of various lengths in order that side springs or end springs or other style of gear may be suspended with equal facility. By the use of this device the gears may be compactly stored as fast as they are varnished, and so placed that they are exposed to the minimum quantity of dust and foreign matter circulating in the room. The importance of this advantage will be readily understood by all carriage painters and finishers.

Steel and How to Treat It.—4.

JOSEPH V. WOODWORTH.

Gas Blast Heating Machines and Furnaces.

The great development which gas blast heating machines and furnaces have had during the past few years has been such as to make them adaptable for a variety of uses well-nigh innumerable; so that such machines have almost completely superseded the old methods and furnaces in the majority of establishments—large and small—where a supply of gas can be had at rates which make

its use for heating allowable. In all processes of steel treatment gas furnaces are now being used in securing the highest possible efficiency, as the steel or articles treated in them can be subjected to the proper degree of heat uniformly.

To-day, gas blast furnaces and heating machines are being constructed for the economical use of gas as fuel in forges, hardening and tempering machines, crucible furnaces, annealing, enamelling and case-hardening ovens, and drying and baking kilns, the heat being generated by injecting under positive pressure a properly proportioned mixture of air and gas, through burners especially adapted to each of the different kinds of gas in common use.

To the steel worker, the one advantage to be gained by the use of gas as a fuel for steel treatment, is derived from the fact that perfect adjustment of temperatures may be obtained to suit any special requirement which may arise in either heating for forging, annealing, hardening, tempering, or case hardening. This is impossible with either liquid or solid fuel. Another and by far the greatest advantage to be gained by the use of gas is the ease with which any desired degree of heat can be obtained by the simple adjustment of two valves—the air and the gas valves. The uniformity of the distribution of the heat within given space, the partial or complete absence of oxidation, and generally the perfect uniform conditions under which any heating process necessary in steel treatment may be performed, are other advantages which the steel worker may derive from the use of gas as fuel in a furnace that has been practically designed and properly constructed.

Among the arguments used by those who are somewhat biased in favor of the

the steel worker with reference to furnaces for hardening, tempering, annealing, or case hardening large quantities of work, or small quantities of accurately finished parts. The reason for this latter contention is that no approximately equal amount of perfect work can be obtained by the use of any other fuel than gas.

As an illustration of the difference in the work heated in gas furnaces and that heated with other fuel, we will say that a number of accurately finished cutting tools are to be hardened. Half of the lot we heat in a coke, soft coal or charcoal fire, taking the utmost care to bring each and every one to the same uniform heat. Then we quench the tools and temper them. Upon using the tools for cutting we find that some stand up well while others do not, but instead, crumble away. This state of affairs comes about through the uneven heating of the steel in the open fire; the

cutlery; while for drop forgings they are used almost universally. The great advantage of the use of gas forges for forging lies in overcoming the tendency to overheat the metal; a non-



Fig. 17. AXLE LOOP FOR USE IN SMALL PAINT SHOP.

oxidizing atmosphere reducing the scale to the minimum; thus supplying properly heated stock as fast as it can be handled.

While offering decided advantages, no single gas forge will replace the ordinary coal forge in everything, because to be thoroughly effective, as well as economical in gas consumption, the gas forge must be made for a definite range of work, and its heating area limited so as to conform to the size and shape of the work, allowing, of course, for a fair amount of clearance space.

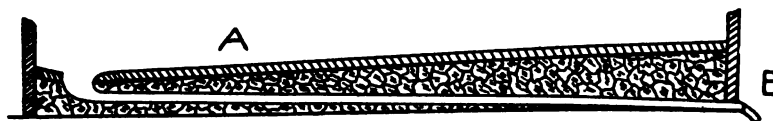


Fig. 18. A—FLOOR RUBBING DECK. B—DRAINAGE PIPE.

process tending to prevent the toughening of the grain of the steel while still allowing of its being hardened sufficiently when quenched. On the contrary take the other half of the lot and heat them to the proper degree in a gas furnace in which they will be heated evenly and uniformly. Then quench them in the bath and draw the temper. With these tools it will be found that they will be very hard and that the edges will hold a long time, because for the given degree of hardness resulting from quenching the same degree of toughness has been imparted to the steel during the heating process, resulting from an even degree of heat imparted uniformly in a chamber from which the products of combustion have been excluded.

With regard to gas blast furnaces for forging it may be stated that they will heat the work quickly, uniformly, and with little or no scale, and that, besides being

always ready for use, they develop the required degree of heat in a few minutes. Gas forges are now in use in the majority of machine shops for tool dressing and forging, and in other establishments and shops in the production of large varieties and quantities of small forgings, such as

For general shop work a combination gas furnace is the best, as it combines on one base the three most useful furnaces for general shop and tool work—muffle, forge and crucible. The muffle can be heated to a good hardening heat in from ten to twelve minutes, when it can be kept at the desired temperature indefinitely. In the forge a piece of 1-inch round steel can be heated to forging heat in about three minutes, starting with the furnace cold; while for lead hardening the crucible full of lead can be heated to a cherry red in about one-half hour.

A furnace of the type above described may be purchased for about \$125. It will occupy very little room; will not require to be connected to chimney; can be placed anywhere most convenient; is always ready for use; and will cover such a wide range of work as to make it practically indispensable when once used. All sorts of hardening and tool-dressing as well as small forging can be accomplished by the use of the forge section, while in the muffle accurately made small tools, such as dies, cutters, reamers, punches, taps, drills, springs, cutlery, etc., can be heated under the best possible conditions without the possibility of scaling.

In concluding this chapter I wish to impress upon the steel worker, or

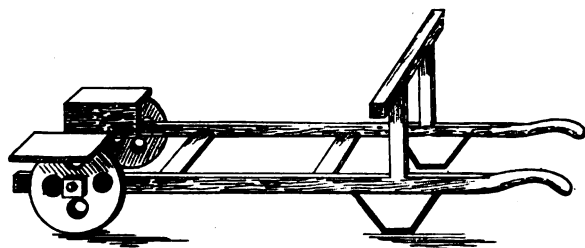


Fig. 15. USEFUL FORM OF SHOP TRUCK.

old methods, that of "cost of gas as compared with other fuel," is the favorite. Now, while this may be an important factor in determining the adoption of gas blast furnaces for the cruder processes of melting or rough forging, it deserves absolutely no consideration from

manufacturer whose product involves the heating of metals, the necessity of having modern apparatus for systematically applying heat; the quality of the mechanic's work and the product of the manufacturer's plant depends quite as much on this as on any one other condition. Hence to get good results, use good steel and heat it properly, and the satisfactory hardening, annealing or forging of it will be assured.

The steel worker who expects good results without using the best materials

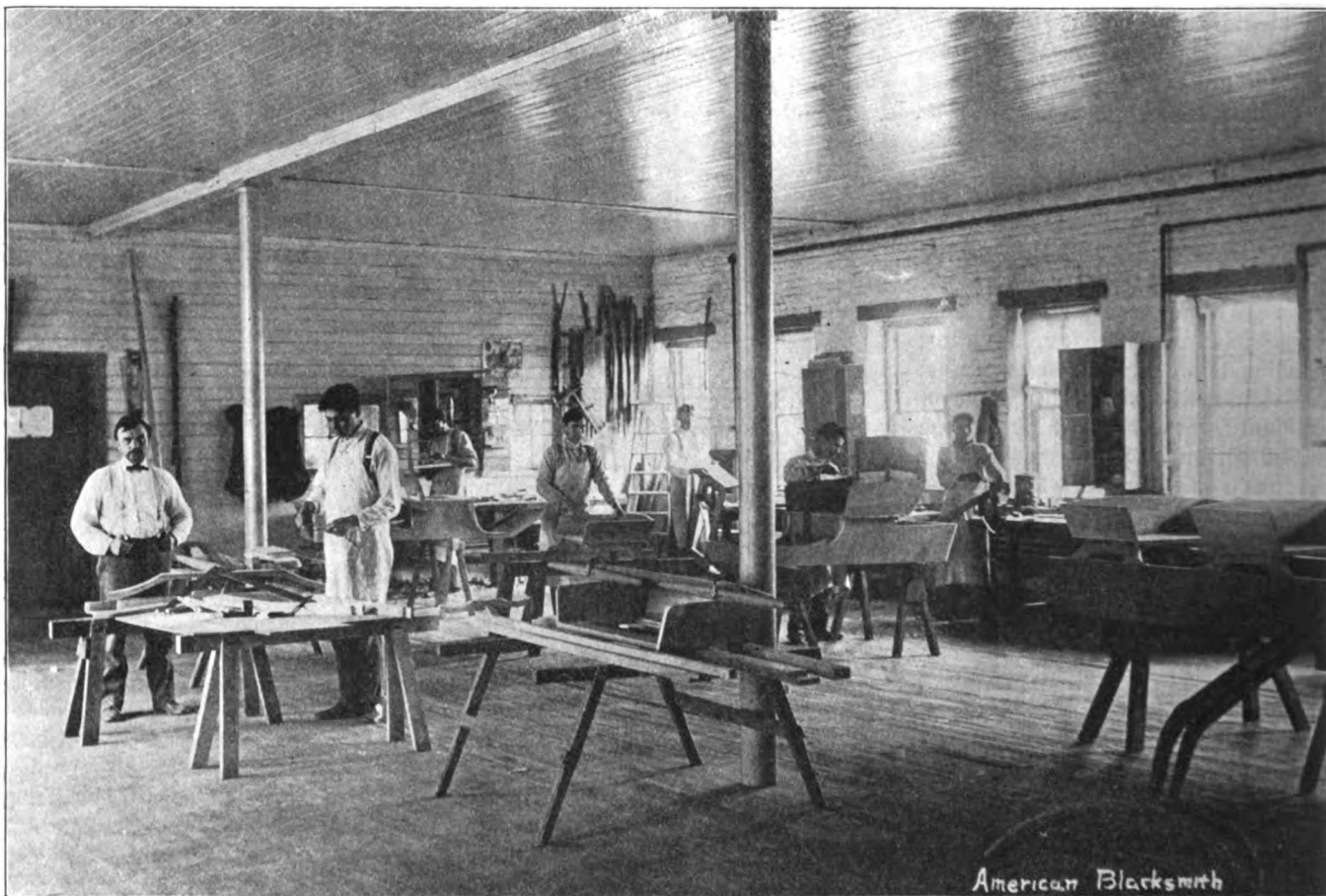
maintained as an industrial school. Blacksmithing takes a high rank among the trades taught at the institution because it is attractive to the boys and places them in a position of independence, since the course of instruction undertakes to prepare them to conduct a general blacksmithing and horse-shoeing business.

During the first year, instruction is given in the construction of forges, names and uses of tools together with their care, fuel and fire building, the

steel that comes into the shop; the blacksmith's fuel; names, uses and care of tools; anatomy and treatment of the horse's foot; the blacksmith's place in the business world; and other topics pertaining to the trade.

The first engraving shows a portion of the shop where several young Indians are at work upon wagon-bodies and parts. The second shows a further view of the wagon shop and horseshoeing department.

The wisdom of providing for instruc-



CARLISLE BOYS AT WORK IN THE BODY DEPARTMENT OF THE WAGON SHOP.

and modern apparatus is invariably doomed to disappointment.

(To be continued.)

Blacksmithing at the Carlisle Indian School.

The Carlisle Indian School was established in 1879 by Captain (now Colonel) R. H. Pratt for the purpose of providing such training for the Indian youth of the United States as would enable him to meet the demands of civilized life. Colonel Pratt wisely foresaw that the Indian's extinction could be averted only by his learning to do something that civilized people wanted done, the profits from which would yield him a proper livelihood. Consequently, Carlisle was made and has ever since been

simpler exercises in forging, etc. In the second year, welding, bending, twisting, tempering, annealing, etc., are considered, with the action and uses of the various fluxes and the use of the drill press. The third and last year is devoted to advanced work in welding, tempering, brazing, polishing, etc. Careful attention is paid to horse and mule shoeing, including a study of the anatomy of the foot and the treatment of faulty feet.

Care is taken to leave out all frills and confine the boy's attention to the essentials of the trade. The instructor is expected to give frequent talks on such subjects as the distribution of iron ore and its conversion into the iron and

tion in blacksmithing is completely proved by the gratifying number of young men from the school who are now filling responsible places in this important industry. The blacksmith is a substantial member of society, and the Indian makes a substantial blacksmith.

The name Carlisle is interwoven with history, first of Colonial days, secondly of the Revolutionary War, and lastly of the Civil War. Benjamin Franklin made a treaty with the Indians at this place in 1753, about two years after it had been separated from Penn's vast acres and called Carlisle. The Hessians captured at Trenton during the Revolution were held as prisoners here. At the south entrance to the grounds still remains an

evidence of their labor in a stone building erected by them. Again, in July, 1863, when the Southern army made its great venture north of the Mason and Dixon line, which culminated in defeat at Gettysburg, Fitzhugh Lee stopped to shell Carlisle, and burned the buildings at the post. These, however, were rebuilt in 1865. For years, the place had been used for a school to train cavalry to fight Indians—a peculiar fact since the children of these Indians were afterwards brought here to learn the arts of peace.

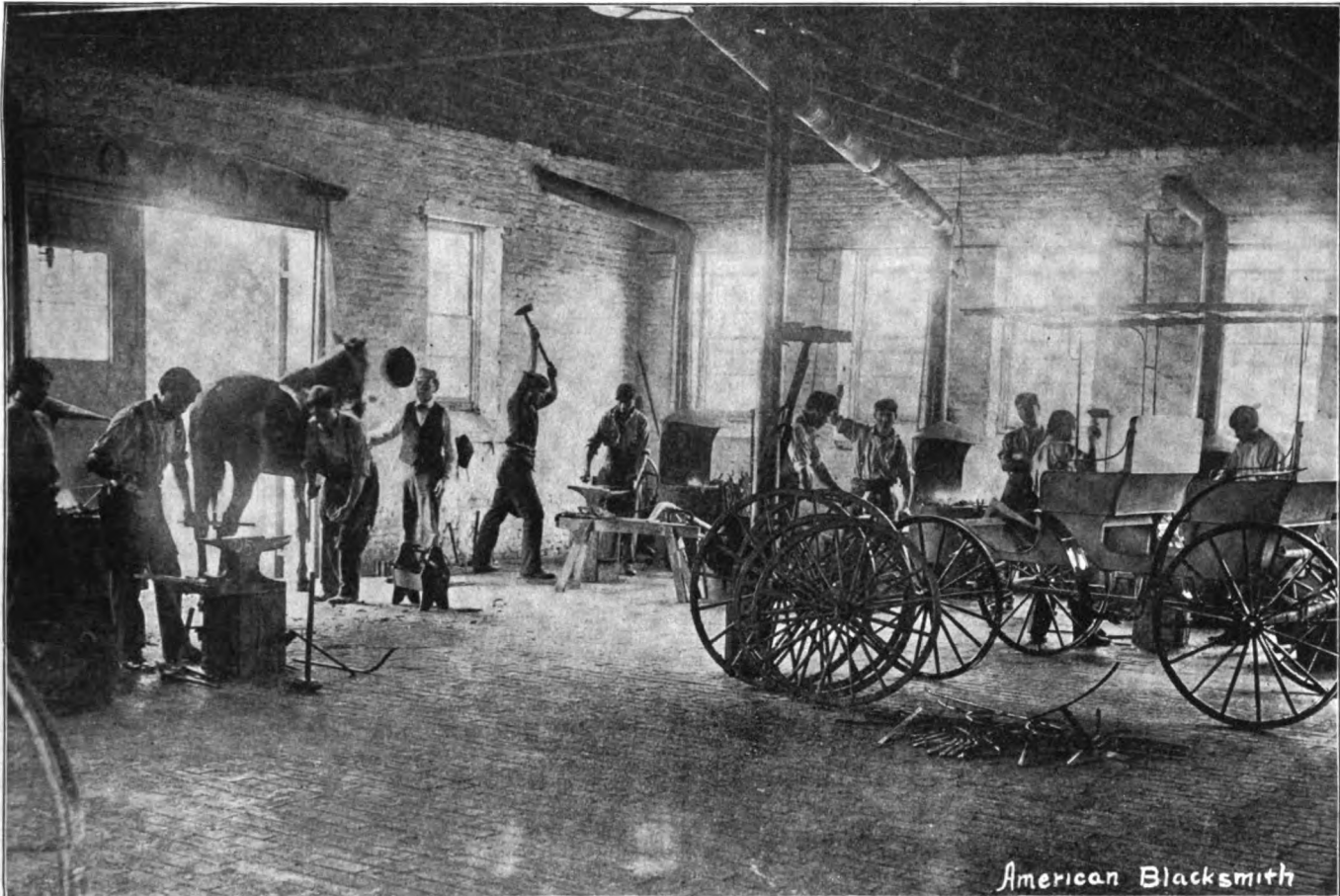
Indian the lessons of thriftiness and diligence. And these are the qualities most necessary to be cultivated in the race.

Notes on the Care of Unshod Feet.

W. B. ALLEN.

In my experience, I have found that it is a very good idea for the horseshoer to be well posted upon every possible detail connected with the care of horses. Not only does it put him in the way of earning an occasional extra dollar, but his knowledge and sound advice about things "horsey," will attract the custom

ing confined in stable or small enclosures, excessive growth of horn will result in injury if not properly attended to. Undue growth of horn in this way soon throws the foot out of proportion, alters the bearing, brings strains upon parts which should not take them, and the joints and tendons are soon affected. Overgrowth of horn not only harms the foot but the leg also. Further than this, the excessive growth at the heels, if not removed, will prevent the horn from coming into contact with the ground



SOME OF THE WORK GOING ON IN THE BLACKSMITH SHOP AT CARLISLE.

The first Indians arrived at the school at midnight, October, 1879, a party of eighty-two untaught Sioux boys and girls from the Rosebud and Pine Ridge agencies of Dakota. They were in native dress, with blanket, long hair and painted faces, and adorned with beads and other ornaments.

Indians from more than seventy different tribes have been brought together at Carlisle, where they are taught to consider themselves, not as rival tribesmen but as American citizens. The first principle of the school is to enable the Indian youth to live useful, happy lives after the ways of civilization.

The blacksmithing craft is peculiarly adapted for instilling into the young

of a great many horse owners. I do not mean to advocate that a horseshoer should try to take the place of a veterinarian, but he will find that no accurate knowledge about the horse, his parts and care, will ever go amiss.

The care of unshod feet is a matter of considerable importance. The shoer of course sees frequent examples of harm resulting from lack of attention to shod feet, when the shoe is allowed to remain on the foot too long. Great injury often comes from want of attention to unshod feet. In his natural state, with entire freedom of large pasture land areas, the horse needs little care, for growth of horn is balanced by natural wear. When he is restricted in his movement by be-

and exercising its proper function. Contraction may follow. Of course the horn may grow excessively long in front, behind, or on either side of the foot, but in any case an unnatural and harmful condition is set up which should not exist and which should of course always be prevented.

Young horses, whose parts are still plastic and growing, are more apt to be injuriously affected than horses whose growth is complete and conformation fixed. Many a horse has been permanently injured by lack of attention to his feet while young, and it is a sure way of lowering his value when grown, to allow him as a colt to run in pasture without inspection of his feet.

¶ Hence it will be agreed, that when the natural wear of horn is not sufficient to preserve normal conditions, regular attention to the feet is necessary to preserve healthy feet and a good conformation. Especially is this true of young growing horses or those confined. Cutting or paring of frog and sole is not necessary unless the growth has been allowed to become abnormal. A frequent and judicious use of the rasp is all that is necessary. In this way are natural conditions most nearly approached, and the horn preserved at a proper height on all sides of the hoof.

Timely Talks on Carriage Repair Work.

A. J. YEAGER.

The prosperity of our country has created a demand for carriages and buggies beyond the comprehension of man. They are produced in such large quantities in all parts of our country, that the business of carriage and buggy repairing has become a vast one. Having spent a quarter of a century at that business I thought I might be of some benefit to the many readers of your paper and more so to the younger men starting in the business, if I should give them a few pointers as to how to repair some of the more difficult parts when such are needed.

I shall first explain how to set an axle so that it will run right, hold the oil and wear well. Now in order that the axle may do this, it must have the proper gather and pitch, and to get this result a mechanic must know how to go about his work. An axle properly set means more than some smiths think. First set your axle so that your wheels will set $\frac{1}{4}$ inch under plumb spoke when the vehicle is not loaded and wheels have from $\frac{3}{8}$ to $\frac{1}{2}$ inch dish sitting on a level floor. Now give the axle enough gather so that your wheels are $\frac{1}{4}$ inch closer together at the front than at the back side, measuring at height of axle. This

right about this axle setting, but we are not all fixed with the necessary tools to do this work so that it will be the same every time. I will give a sketch of an axle-setting tool that I made myself some fifteen years ago, and I am still using it. I have seen all the fancy-priced and complicated axle sets that are on the market, and I would rather have the one I use than anything that I have ever seen. Any good workman can make it in less than half a day and it will always be in tune and never wear out. The long part is made out of 1 by $\frac{1}{4}$ -inch steel tire or anything that will hold itself in shape. The square head is made out of Norway iron forged so that it will spring at A, and runs through the head at B, held with set screws so that you can set it any desired pitch or gather you may want. The distance across at A is about 8 inches, and the length at C is about 8 $\frac{1}{2}$ inches. The outer faces of the places marked C are finished to a perfect straight edge, and are made of steel $\frac{1}{4}$ by $\frac{1}{4}$ inch. The small end is made the same length as the head forked at the ends so as to rest on the axle at opposite end from head when in use. This should be forged with slot in centre and slide on long piece, held with a set screw to make it adjustable for any length of axle. One side of the tool I use for gather and the other side for pitch. For convenience I paint one side red and the other side black so to be sure and make no mistake when setting an axle.

(To be continued.)

A Good Way of Making Small Socket Wrenches.

Mr. S. H. Hoover, already known in these columns for his handy wrenches, gives us the following description of his method of making wrenches of, say, from $\frac{1}{8}$ inch to 1 inch diameter.

He takes a piece of solid stock, B, of required thickness and draws out one end as shown in the accompanying

This makes a very useful wrench, and is very simply and economically made.

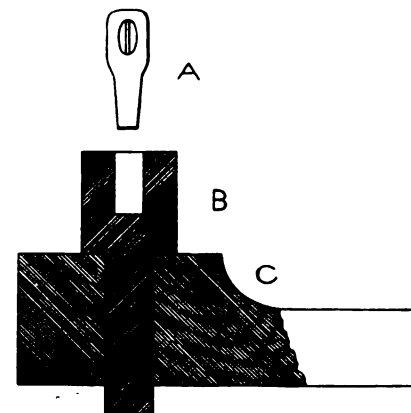
The Elementary Principles of Mechanical Drawing.—4.

Different Kinds of Drawings.

There are many ways of representing objects on paper, each way having its peculiar advantages. These different modes of representation are called different kinds of drawings.

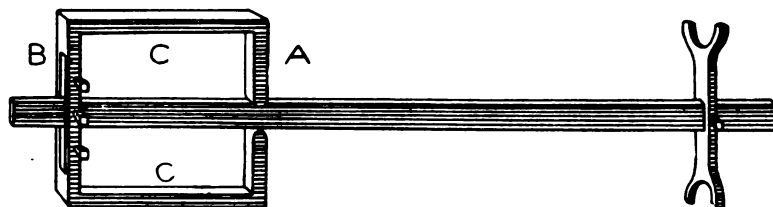
Perspective.

Perspective is that form of drawing which represents objects as they appear,



picture fashion. Whenever we look at a view or object, we see it in perspective. One property of perspective drawing is that those parts near the eye appear larger, and those more remote appear smaller. This characteristic, whereby sizes and distances appear smaller and smaller, the further they get from the eye, is termed "foreshortening." The fact that the more remote appears smaller makes it difficult to form a true idea of the relative size of parts. Only a portion of each object is visible, moreover, and the part not seen must be imagined. It often happens that the object to be illustrated has not been made, and so must be drawn from imagination, or it may be so placed that it cannot be photographed. In these cases a perspective drawing may be made. Otherwise, the camera gives the best and cheapest perspective.

All parallel lines which recede from the eye appear to converge or come nearer and nearer together, when viewed in perspective, until, if continued far enough, they seem to meet in a point. A certain horizontal line on a level with the eye and at right angles to the line of vision is called the horizon. Towards this all horizontal parallel lines converge, those above the level of the eye slanting downward and those below the level of the eye slanting



AN EXCELLENT HOME-MADE AXLE-SETTING TOOL.

will cause the wheel to run towards the collar of the axle, and should you take the axle nut off, the wheels would run on a straight road for miles and not come off the vehicle.

Now some men will say that I am

sketch. This end he places in a heading tool C, down to the shoulder. The next step is to punch a hole in the stock with a hammer-tool as shown at A. The hole may be punched round, and then formed to the required shape over a mandrel.

upward. All horizontal lines which are parallel to each other seem to converge toward a point in the horizon called a vanishing point, and each different set of parallel lines has a different vanishing point. Follow with the eye, the course of a receding railway track and notice how the rails seem to draw gradually

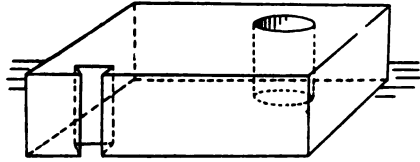


Fig. 1. AN EXAMPLE OF PERSPECTIVE, SHOWING A SOLID BLOCK WITH CYLINDRICAL HOLE AND MORTISE.

nearer until at last they appear to meet. This point where they meet is the vanishing point for those lines. The track being horizontal, this point will be seen to lie at the horizon. Many familiar instances will be recalled.

Perspective may be used to advantage when the object to be drawn is small, simple or of common occurrence, so that the unseen parts may be easily supplied in the mind. In this case the dimensions may be placed upon the drawing. It is also of especial advantage in drawing scenic and architectural subjects, or when it is desired to represent an object as it appears to the eye. Fig. 1 gives a perspective view of a rectangular block with a mortise and a cylindrical hole in it.

Working Drawings.

Perspective drawings, as has been explained, show objects as they *appear*. Since appearances cannot be relied upon for accuracy, another form of drawing must be used when it is desired to show

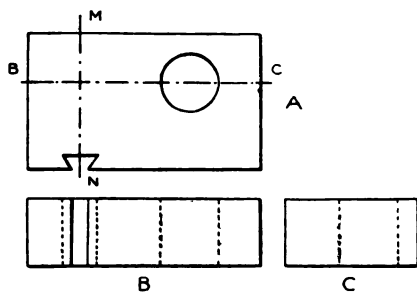


Fig. 2. TOP PLAN, SIDE ELEVATION AND END ELEVATION OF BLOCK.

things exactly as they are, as must be done, for instance, when we wish to build or reproduce an object from its drawing. A working drawing or projection is used for this purpose. In this kind of drawing, the object is shown as it actually is, and not as it appears. Hence, the parts farthest from the eye will appear of their true size compared with those nearest. In ordinary cases, a side view (called a side

elevation), an end view or end elevation and a top or bottom view or plan, are the only projections necessary to explain an object. But sometimes when the parts are complicated, a separate projection is required of both the front and rear views and the right and left ends as well as top and bottom.

A general view of an object shows the parts assembled. A detail drawing gives one or more of the parts separately and in detail. A sufficient number of views must be given to show the principal faces and allow the observer to form an idea of the general contour of the object, but of course it is always desirable to present it in as few views as possible. Fig. 2 gives a side elevation, end elevation, and plan of the block shown in Fig. 1. By means of dimension lines (not shown here), the exact length of any particular line of the block can be found from one or another of the three views.

It is sometimes convenient to show the interior construction of an object. A boiler, for instance, may be drawn to illustrate the arrangement of its flues. In this case, a view would be given as if it had been cut in half and a drawing made of the cut surface, showing the inner parts. Such a drawing is called a section. Fig. 3, A, is a section on the line BC of Fig. 2, that is, as if the block had been cut in half on the line. A section may be taken through any part of an object. Fig. 3, B, is a section on the line MN, Fig. 2. Sometimes, even, a drawing may be shown partly in section and partly in elevation as Fig. 3, C.

A working drawing from which a tool or article is to be made must show an exact picture of each separate piece, i. e., a projection of each principal surface. In the construction of a locomotive, for instance, every part is shown in the drawings (even the bolt holes being indicated) and these being all made, may be put together easily and quickly in the shop.

Isometric Drawing.

A special kind of projection, which, however, is little used for practical purposes, is isometric drawing. This kind of drawing combines the advantages of perspective (viz.: showing three views in one) with those of the ordinary working drawing, which gives the true proportions of lines. The object is supposed to be tilted into such a position that the intersection lines of the three parallel faces, the axes MN, MO, MP, Fig. 4, make angles of 120° with each other on the drawing. It is usual

in practice to make all lines which are parallel to one of the three axes, represent the true length of the line itself. For instance, if we were drawing the block full size and the longest edge were two inches, the lines MO and NQ would be made two inches long. If the drawing were half size, it would be drawn one

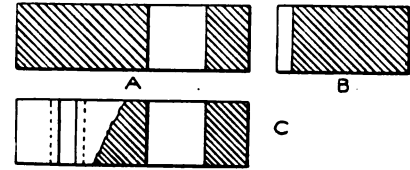


Fig. 3. A—LENGTHWISE SECTION DRAWING OF BLOCK. B—TRANSVERSE SECTION. C—SECTION AND ELEVATION IN COMBINATION.

inch long. As mentioned, an isometric drawing gives a simple method of showing three faces of an object in one view, at the same time allowing the lines to be represented in their true lengths, or to an accurate scale. It is specially adapted for showing small objects in which the principal lines are at right angles with each other, as in the drawing here given.

In making small articles, the drawings may sometimes be applied to the wood or metal to get the shape, but when the surfaces are irregular this is not convenient. A method often used is to employ templets or patterns. In order to secure the correct proportions, all working drawings must be drawn to scale, i. e., an inch on the drawing must represent a definite measure upon the thing to be made.

The succeeding chapter will be de-

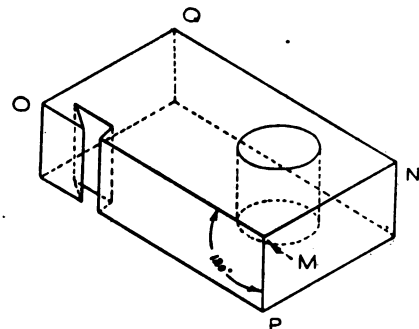


Fig. 4. ISOMETRIC DRAWING OF BLOCK, SHOWING CYLINDRICAL HOLE AND MORTISE.

voted to a discussion of working drawings. The remaining articles of the series will comprise a complete and thorough course in mechanical drawing as required by the blacksmith. How to read drawings and to calculate the amount of stock with allowance for finish will be a very important topic under discussion later on. Examples will also be given of technical drawings of special mechanical contrivances, as nuts, bolts, etc.

(To be continued.)

The Country Blacksmith.

BY A SUBSCRIBER.

Under the worn and leaky roof
The country blacksmith stands,
Clasping a kicking horse's hoof
In large and brawny hands;
An ugly brute, that will not stand,
Despite his stern commands.

He wonders as he works away,
How long 'twill be before
He'll get his customers to pay,
That old, unsettled score;
And yet he really dare not say,
"Your credit's good no more."

His task is done at last, and then
The farmer says, "That looks
A right good job. If you don't mind,—
Just put it on the books."
The blacksmith longs to land him one
Of Corbett's fierce left hooks.

Then to the post-office he goes,
To get his morning's mail.
The city jobber, whom he owes,
Is camping on his trail,
And says that he must settle up
In two weeks without fail.

That night when all the village folk
Were wrapped in slumber deep,
He nailed a sign upon his shop,
Ere he returned to sleep,
It was a large and glaring sign,
And read



How many smiths are there in your vicinity? Are you taking the lead?

What about the fall trade? Are you ready for any job that may come along?

Reach out for new work. Let no opportunity slip for widening your field.

The threshing engine season is now on. Have you learned any new kinks since last year?

September—another volume completed. Compare the last issue of this volume with the first of the former one. Any suggestions?

Is the shop large enough—light enough for your needs? If not, put in a few days before the busy time commences, and get it into shape. You will be glad before winter is well set in.

Small country shops furnish many an apprentice to the machine blacksmith shops of the city. The young or mentally growing smith will find it pays to read about every branch of his craft.

A new metal, called "guldiner," has been made in Bergen, Norway. It looks

very like gold, is hard as steel and pliable as tin. Foreign demand has already been created, and a factory has been erected to supply the needs.

Experience, like anything else, may be long without being broad. It is the man of broad experience whose opinions have weight and whose work is reliable. Fifty years at the anvil may fail to give a man the most valuable experience.

If it's a good thing, recommend it to somebody else who may need it. If you like *The American Blacksmith*, tell your neighbor about it and let him benefit by it, while you benefit by the subscription commission. You will help one another.

In hardware circles prosperity still continues. The establishments are employed to their fullest extent, new ones are being installed, and the demand keeps pace with the supply. This shows that "something is doing" in mechanical circles as well.

He knows it all.—That's what the narrow-minded blacksmith will tell you. As a matter of fact nobody living "knows it all." Any man, with a head capable of learning, can learn from good craft literature. Don't get the idea that you know it all.

Always ready—always prepared for an emergency—that's what a blacksmith should advertise. In some of our large cities certain machine shops advertise "Lathe work night and day," which, in these days of constant running of machinery is in itself a recommendation to the energetic tradesman.

Ever hear of a horse going up stairs to get out of the wet? Down in Western Pennsylvania, in a flood, a horse broke his halter and ascended to the loft of the barn. When the water went down, he could not be coaxed to descend until an inclined runway had been built. Wasn't this intelligence? Or what was it?

The man who cannot, with honest effort, make a fair living at his trade is decidedly in the wrong sphere, for any craft will yield a comfortable livelihood to the able craftsman. The fault or misfortune of failure lies in the individual man, and he should strive to make a change of some kind. Investigate first, though.

Many are the ways of meeting an emergency. One man will sit down and think about it, another will start right in to do it on experiment, while a third will not attempt it at all. Undoubtedly the best way is to have the necessary tools and materials always ready, and then when an extraordinary job is presented, to think about it and set to work in a rational way, determined to "do or die."

A nail-less horseshoe is the latest thing in its line, says the Teamster. One has been invented by Mr. Josiah Serfass, of Hazelton, Pa. The shoe is provided with metallic straps which rise to a common point near the top of the hoof. These straps are hinged to the shoe, and connected at the ends by a threaded bolt, which can be turned with a small wrench to clamp the straps over the hoof.

An interesting fact to the rubber-tire man, is that a new plant has been dis-

covered in the Congo, whose long fibres contain a considerable quantity of rubber. The unscientific methods employed in obtaining rubber have worked havoc with the rubber plantations, resulting in the high prices of the present time. This new discovery, it is hoped, will tend to lower the prices on raw material.

Don't you think it would be a good plan (writes a subscriber) for *THE AMERICAN BLACKSMITH* to conduct an experimental shop? I have read in farm papers of experimental farms run for the benefit of readers, and as *THE AMERICAN BLACKSMITH* asks for suggestions, the idea of an experimental shop occurred to me. In it we could have tests of different kinds made for our information. I think it would be a good thing.

Much good experience is lost, because, for some reason or another, the average blacksmith does not want to impart it to the craft. Having won knowledge by hard work he wants to keep it for his own especial benefit, so he guards it carefully instead of spreading it abroad. This is a mistake, for a good thing is none the less good because it is useful to many, and every man owes it to the world at large to raise the standard of his craft as high as possible.

Two years gone and not one complaint from a reader about a humbug advertisement! A record we are proud of. Much advertising appearing in other journals has been denied appearance in *THE AMERICAN BLACKSMITH*. Columns open only to honorable business houses of unquestionable standing. All others debarred. The offer constantly holds good to reimburse subscribers for losses resulting from *AMERICAN BLACKSMITH* advertisers who may chance to prove unscrupulous.

Thinking of advancement in scientific knowledge, consider that (according to a contemporary) in 1740 one Christian Polhem, a noted Swedish steel worker, wrote, "It is well known that steel is made from iron, like brass from copper, but the exact method is not well understood. As long as the iron retains its natural sulphur it remains soft, but when this is extracted it becomes hard, and is called steel. The whole art lies in the extraction of the sulphur." If some of the present-day theories are as logical as this one was in 1740, a lot we have still to learn!

Tom Tardy was diligently wrapping a piece of wire around the broken handle of his sledge, when we dropped in the other day to ask him what was on his mind. "It does beat all," said he, "how my mail piles up—seems like I can't ever get all my letters answered." Tom went over to the dry goods box which answered for a desk, and took out four very much soiled letters. "This one," showing us a courteous business letter which asked for the favor of a reply by return mail, "This one I must answer right away." It was four months old then, but Tom carefully laid it away again to think about it a few more months. Walking away, we couldn't help but think that if our worthy friend took as long to die as he did to do everything else, he would come to be a very old man. Most people in present-day America, however, prefer not to live quite as slowly as Tom does.

American Association of Blacksmiths and Horseshoers.

The numerous inquiries received from various sections of the country show that the question of organization for mutual benefit is occupying the minds of a great many thinking craftsmen. The purpose of this Association is to further the interests of the craft in every possible way, by assisting in the formation of associations and by furthering beneficial legislation as far as possible.

We wish to strongly urge blacksmiths in every locality to give the matter of organizing their attention. We will gladly furnish plans and instructions for forming such associations, and aid in every possible way. Do not wait for winter to come on and make the roads bad, but take up the question with your neighbor smiths now while meetings can be conveniently held. Send to the American Association of Blacksmiths and Horseshoers, Box 974, Buffalo, N. Y., for plans and advice.

Do you feel the need of a Lien Law in your State to adequately protect you from losses by bad debts? Will you interest your brother craftsmen and aid in getting such a law passed? Let us hear from you.

Thomas Blanchard.*
DWIGHT GODDARD.

Thomas Blanchard started out in life under very discouraging circumstances. His father was a New England farmer, of Huguenot descent, who added to his income by doing blacksmith work for his neighbors.

Thomas was born in 1788, at Sutton, Mass., the fifth of six sons. As a boy he was far from promising, stuttering badly and counted by some to be half foolish. He took little interest in farming or study, and spent his time whittling shingles, making windmills and miniature water wheels. As he grew older he became interested in iron work, and as his father refused him the use of his forge, he saved up all the charcoal he could gather and hid it behind a wall. Then he built a rude forge and used an old wedge driven into a log for an anvil, waited until his parents were absent and tried his hand at working iron.

At thirteen he heard of an appleparing machine, and after patient experimenting and repeated trials succeeded in making a machine that would pare more apples than a dozen girls at the winter "bees."

*THE AMERICAN BLACKSMITH is indebted to Messrs. Wyman & Gordon, Worcester, Mass., for the above most interesting sketch of the success of a man whose earliest efforts were along a blacksmithing line.

This success deepened his inventive interest and made him of less use on the farm, so when eighteen his father sent him to work for an elder brother who made tacks at the neighboring town of West Millbury. Here he was put at the monotonous work of heading the tacks by hand. The points were first cut from strips, and then had to be picked up by the thumb and finger, gripped in a vise, and headed by a blow. He was given a certain number to be made each day. One of the first things he made here was a counting machine that would ring a bell when the required number was complete. His brother forbade him spending any time in these idle projects, but his inventive genius could not be suppressed. He began to consider a machine to cut and head the tacks at one operation. The idea came to him long before he had the skill or means to construct. For six long years he worked at the idea, expending everything he could earn to buy materials, throwing away the old as new improvements suggested themselves, carrying the models about with him from place to place, persisting in spite of every discouragement. He became so poor that his own brother refused to trust him for groceries, even when his family was actually suffering.

At last it was a success; it made much better tacks than could be made by hand at the rate of five hundred a minute. It was sold for \$5,000, which placed Blanchard in comfortable circumstances. The tacks were all sold, for some years at least, to one house, who kept the source of supply secret and realized handsomely on the sales.

At this time the attempt was being made by the Government to manufacture its muskets in this country; one of the shops making the attempt was located at Millbury. The barrels had been made by hand, but the process had been so far improved that the straight part of the barrel was then being turned in a lathe. There was an irregular enlargement at the butt where it was joined to the stock that still had to be finished by hand at considerable expense. Blanchard's inventive powers becoming recognized, he was sent for and asked if he could get up a machine that would do this. He said he would try, and it was not long before he suggested the addition of a certain cam motion to the lathe that would permit turning the cylindrical part and the flat and oval end at the same operation.

The knowledge of this coming to the attention of the Government, he was

sent for to introduce it at the Springfield Armory. While the workmen were gathered around to witness its operations one said to another, "Well, John, he has spoiled your job." Still another exclaimed that "he could not spoil his, for he could not turn a gun stock." Blanchard overhearing the remark answered, "I am not so sure of that, but I will think of it a while." On his way home soon after, the whole principle for turning irregular forms came to him. In a short time Blanchard had built a wooden model of his idea, and, sure enough, it turned a miniature gun stock with perfect accuracy.

The principle is this: A pattern and block to be turned are fitted on a common shaft, that is so hung in a frame that is adapted to vibrate toward or away from a second shaft that carries a guide wheel opposite and pressing against the pattern, and a revolving cutter wheel of the same diameter opposite the block to be turned. During the revolution of the pattern the block is brought near to or away from the cutting wheel, reproducing exactly the form of the pattern.

The beauty of the invention is that by varying the relative sizes of the guide wheel and cutting wheel, any variation in size relative to the model can be secured, and by reversing the transverse motion of the cutting wheel, a perfect right and left can be made from the same pattern. Then by varying the transverse speed of the cutting wheel in relation to the guide wheel, the object is made either longer or shorter than the model.

Blanchard immediately secured a patent and was paid by the Government to set one up at the Harper's Ferry Armory, and later at the Springfield Armory. The introduction of this machine opened up the way to others. Blanchard was placed in charge of stocking muskets at the Springfield Armory, and during the next five years introduced no less than thirteen machines for the better manufacture of muskets. The most important of these was a machine for making the irregular recesses in the stock for the barrel, lock, etc. The idea for this machine came to him, it is said, from watching the labors of a wood-boring insect.

Being thus occupied in Government work, opportunity was open to infringers of the patent to apply it in other ways. During the first term of the patent no less than fifty machines were put in operation for various purposes, turning

shoe lasts, wheel spokes, tackle blocks and hat forms, from which he derived no benefit. The patent was originally granted about 1820, and was twice renewed, a very unusual proceeding.

In the early history of this invention the question of reality of invention was contested by one of his neighbors. A hearing was granted, to be held on the village green. The neighbor, who was a brass worker by trade, presented a beautifully made model in brass, while Blanchard's model was a crude wooden affair, but the evidence was altogether in his favor, and little was heard afterward of this contestant for the honor of inventing the lathe for irregular forms.

Blanchard had many troubles in defending his patent, and even to the end realized but a comparatively small amount directly from the invention.

By this time Blanchard came to considerable repute as a mechanical expert, and was frequently employed henceforth in lawsuits and investigations in that capacity.

In 1825 Blanchard became much interested in the subject of steam road wagons. While still at the Springfield Armory he made a working model that was very successful and for which he received a patent. He had ideas also about rails and turnouts, but his efforts to organize a company or secure capital, first in Boston, and later in New York, having failed, he apparently abandoned the idea.

In 1826 an effort was made to improve the navigation of the Connecticut River. At first steamboats were tried, but the rapids were so great that it was a failure. Then a canal was built around the worst rapids, and Blanchard was asked to design a steamboat, which he did, but it was also unsuccessful. This failure deepened his interest, and he made an elaborate study of the whole question, the result of which was an important improvement. The improvement consisted in locating the paddle wheel at a particular distance beyond the stern, where the water set in with the greatest velocity. Hitherto the wheel had been located close up to the stern or at the sides. By Blanchard's discovery the maximum resistance to the paddles was secured, and a steamboat could be driven up rivers whose rapids had hitherto prevented steam navigation. He also built boats with two engines driving the wheel shaft by cranks set at 180 degrees on the ends, which secured the more constant power needed to ascend strong rapids.

The result of his efforts was to move the head of navigation from Hartford to Springfield, and double the travel and transportation between the two places. He even navigated the rapids 150 miles beyond Springfield.

Proving that small rivers could be successfully navigated by steamboats, brought Mr. Blanchard many applications for assistance. By 1830 he had boats running on the Allegheny and other tributaries of the Ohio, and so established his method of construction that it came into general use.

Mr. Blanchard made many other inventions; in all he secured twenty-four patents, one of which was the process of steaming wood for bending. Hitherto when bent sticks were required for ship construction and other purposes, the woods were searched for satisfactory timbers. The U. S. Government paid Blanchard \$50,000 for the use of this patent in ship construction, and other uses, such as for slate frames and bent furniture, also rewarded him.

He also made inventions in woollen and other machinery.

Although he started in life under such unfavorable conditions, he won out in the end. He overcame his stuttering, improved his personal appearance, made up by observation and experience for his lack of education, and by his inventions changed his early poverty for comparative wealth. He was able before he died to fulfill an assertion made to the villagers of West Millbury, when in extreme poverty and youthful awkwardness he was railed against for his shiftlessness, that he would yet "drive up through here in a coach and four."

He died in 1864, leaving a widow, whom he had married only ten months before. She still survives him, bringing closely home to us the recentness of the origin of things mechanical that now seem as though they always had been.

The Manufacture of a Well Known Blacksmith Tool.

The name of Peter Wright & Sons of Dudley, England, is so extensively known as manufacturers of blacksmith's anvils and vises that our readers are probably already well acquainted with it. It may therefore be of interest to give a brief description of the process of manufacture, as these works are carefully kept up to date, and the methods employed are such as look to the production of superior quality. Nearly 200 years ago Peter Wright started the works at Dudley, which have ever since steadily developed, and are today turning out

anvils of finer quality than ever before and worthily maintaining the traditions of the firm. Today in almost every corner of the globe these tools are to be met with.

In the old days all anvils were "built up," i. e., made by welding together a number of separate pieces onto a central block of common iron. Each of these vertical butt welds was of course a grave source of weakness and such anvils frequently broke up. Under the firm's patent, which was the invention of Peter Wright (the great grandson of the founder), all their anvils are made from only two forgings which are called the "top" and the "bottom" respectively, and require only the one weld at the waist, even this being in addition carefully "tied in."

The finest wrought iron scrap is carefully picked over by hand at the forges, and then passed into large furnaces where it is either balled or piled and then thoroughly worked under powerful steam hammers into blooms. After going through reheating furnaces, these are forged with great care under heavy steam hammers so as to form the tops and bottoms from which the anvils will be made.

These forgings are now paired together, and owing to their design the greatest strength and working surface is secured for each anvil according to its weight. These are then handed over to the anvil makers who have been trained to their respective duties all their lives, and have therefore become specialists at their work. This trade is very largely hereditary, and many of the men are representatives of families that have worked for Peter Wright and Sons for generations. These forgings now undergo a further process of hammering and trimming which contributes great toughness and soundness. They are then welded together at the waist under powerful hammers, which ensures that absolute homogeneity of the whole anvil, which is of such vital importance.

The next step is to weld on the steel for the face, and this as may be imagined is a delicate and most important process. The steel employed is of the finest grade, combining all the different qualities necessary for the heavy work that an anvil face has to stand. The firm is constantly experimenting by means of chemical and physical tests, in order to secure the very best material for their purpose. The face of the wrought iron body is heated up to welding point in a large smith's hearth and the

steel slab in another special hearth, both being in charge of foremen who always superintend this process. Specially pure washed fuel is used and a true weld is made without the aid of any patent compounds or mixtures. To make a sound weld of the face of an anvil of say 700 pounds is, of course, a really fine piece of work, requiring the most careful methods and highest degree of skill.

The anvil now has the bick and table trued up, the holes put in and the finishing touches made, after which it is heated to the correct temperature and plunged into great hardening tanks, where streams of water give it the final temper. Long experience has determined the degree of hardness which proves the best and safest to ensure good, all-round wear. The final process is to grind the steel face, which is done on huge grind-stones, and the anvil after being polished is passed on to the warehouse. Throughout this time the anvil has to undergo various exhaustive tests at the hands of one of the principals, for hardness, squareness, and freedom from any flaws. Constant practice enables a trained ear to detect even small defects by the ring given out, and it is all this

care which causes a Peter Wright Patent Solid Wrought Anvil to ring like a bell. After approval the trade marks are stamped on every anvil, these consisting of the words *Peter Wright Patent* and also *Solid Wrought* (the latter being in the form of a circle). In addition to these the green label is affixed, this also being duly registered. The manufacturers state that large orders are constantly being shipped to all parts of the world in face of tariffs and high freights.

The last advices are that a change has just taken place in the ownership of the above firm, Mr. Isaac Nash of Belbroughton, the well-known manufacturer of Walden Scythes, having purchased the business outright. The manufacture of the anvil, however, will be

carried on at Dudley, precisely as before by the new proprietors, who have had long experience in the same trade, and whose anvils have attained a high reputation in England and on the Continent. The two businesses of this latter firm will, of course, be conducted independently.

Hints Preliminary to Shoeing.

BY M. E. M.

In successfully shoeing a horse, much depends upon the preliminary steps taken by a shoer. If every smith would use a little tact in this direction, especially with young horses, perhaps there

the animal. He should speak gently to the horse, and place the palm of his right hand flat upon his shoulder. At the same time he should, with the left hand, stroke the limb downward toward the cannon and seize the cannon in front. Then, with the other hand, he gently presses the horse towards the opposite side, thus relieving the leg of weight, when he lifts it from the ground. The right hand now grasps the pastern from inside and the left from the outside. The shoer next turns partly towards the right and supports the horse's leg upon his own left leg, standing as quietly and firmly as possible the

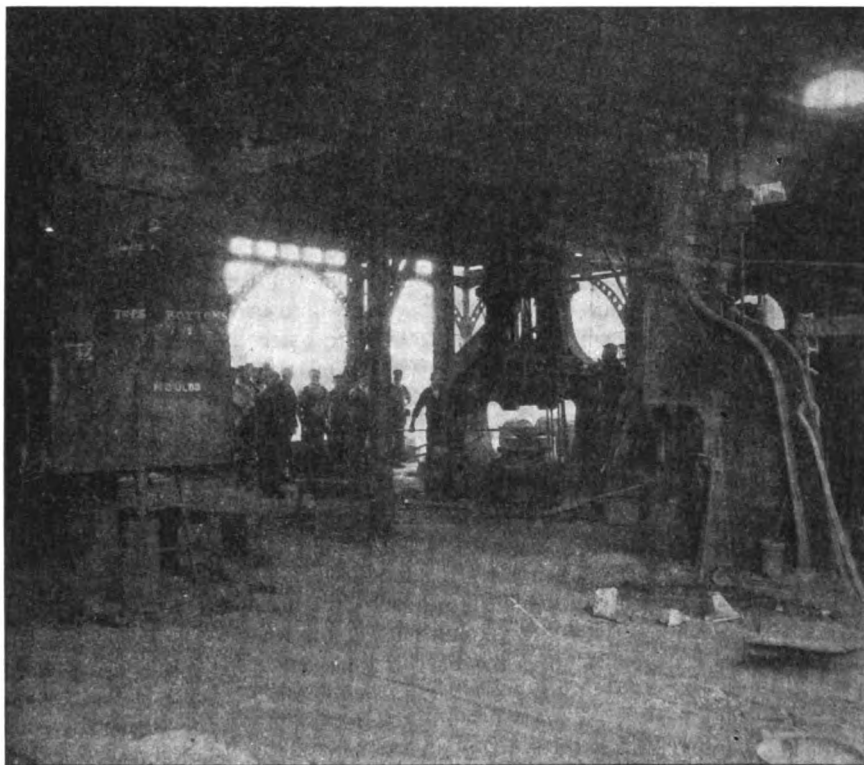
while. In holding the hoof, never raise it higher than the elbow-joint, and never too far back of the elbow. Indeed, a little lower than this is better if possible.

When the left hind foot is to be shod, gently stroke the animal back as far as the angle of the hip. Place the left hand here for support, while the right hand strokes the limb down to the middle of the cannon, and grasps it from behind. The left hand presses the animal's weight over towards the right side, the right hand loosens the foot and carries it forward and outward from the

body, so that the limb is bent at the hock. Now bring the left leg against the anterior surface of the fetlock-joint and carry the foot backward. His left arm passes over the horse's croup and above and to the inner side of the hock. The long pastern should then be seized with both hands.

In shoeing the right feet, follow the same methods, only reversing every process.

Never cause unnecessary discomfort or pain by raising the feet too high or in wrong positions. Do not pinch or squeeze the limb. Always be as quiet and rapid as possible, and avoid all unnecessary noise. These points are well worth attention, as the horse is very sensitive to every sound and motion.



INTERIOR VIEW OF SHOP WHERE THE PETER WRIGHT ANVIL IS MADE.

would be fewer vicious and nervous animals to be shod.

It is a great mistake to suddenly grasp a horse's foot, or to grasp it with both hands. Some horses are naturally high-spirited and the shock they may experience by such treatment cannot be realized by a human being. The horse should be gradually prepared for what is to come. First, see that he stands in such a position that, when one foot is lifted, he will be properly balanced upon the other three. If the animal does not voluntarily take an easy position, gently move him with the hands until it is secured and his feet are well under his body.

When the left forefoot is to be raised, the shoer stands on the left side, facing

When a young horse is to be shod, it is not wise to keep the foot raised too long. Give him a rest between whiles, most especially in this case, be quiet and gentle and never display irritation or temper. It is the memories of these early shoeings that govern the horse's attitude at the forge in later years.

In shoeing an old and stiff horse, raise the foot gradually, and not too high—especially in the beginning of the operation.

Some horses are vicious, whether by

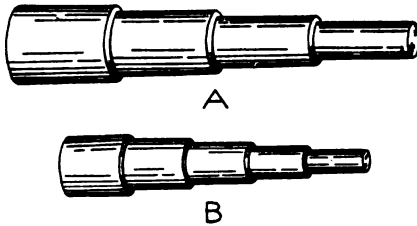


Fig. 43. CONVENIENT FORMS OF MANDRELS.

nature or accident, and a shoer is often compelled to use severity. The ears and eyes are the best index to the horse's mood. The shoer should watch these closely. Every indication of temper should be promptly punished by a jerk of the halter or a few words. If the horse is backed several times over a piece of soft ground, it often quiets him. Various devices have been employed to hold such horses and prevent their kicking, and where every other method fails, the animal may be placed in the stocks. But the shoer should always strive by gentleness to inspire confidence before resorting to severe measures.

Horses that are merely irritable and high-strung are often best handled by firm boldness. To such horses, light touches are much more annoying than energetic handling.

The successful shoer must be able to read horse nature—if it may be so expressed. Methods that succeed with one animal may fail utterly with another. No man should attempt to shoe a horse, who has not full control of his own nerves and temper.

The Railroad Blacksmith Shop.—11.

The Systematic Maintenance and Use of Tools.
W. B. REID.

The creation and maintenance of tools is a constant and necessary factor of economic production in the blacksmithing shop. Apart from expensive forging machines, not generally available, the smith, as his own tool maker, can always have at command a variety of inexpensive devices for increasing his output, limited only by his own ingenuity and resourcefulness.

To have such tools is an important point; the systematic use and maintenance of them is a matter equally important, the full appreciation of which will add intrinsically to their efficiency and value. A few words upon this subject may be of interest.

The most common and useful, and, at the same time, most abused of tools are the round spring swages for use at the steam hammer. No shop of any pretensions can afford to be without a complete set of these from $\frac{1}{2}$ inch upwards, according to requirements. They may be fashioned as elaborately or as roughly and inexpensively as desired. The essential point is to maintain the swaging surfaces in a smooth working condition and at proper standard sizes. To do this satisfactorily it is necessary to have a permanent set of soft steel mandrels, finished to the different sizes of swages kept. To avoid too great a multiplicity of parts each mandrel may contain any convenient number of sizes, Fig. 43, A and B. Made and kept in this way, these mandrels will prove of constant value in making new swages and in restoring worn ones to standard sizes by simply heating the parts and running the proper mandrel through them under the steam hammer. Each mandrel should, of course, be finished slightly larger than the accurate size of swage, proportionate to the shrinkage of the swage in cooling.

Next to a set of round swages a well equipped blacksmith shop should have forging swages for various sizes of balls, bell clappers, collar bolts, brake posts,

and usefulness will be greatly enhanced by a similar method and system of maintenance and use. To make these swages accurately, finished soft steel patterns or originals are necessary. These should be kept carefully under surveillance of the foreman, to be used as occasion requires in replacing broken tools, in restoring shape and proportion of worn ones, or as a sample to the workman of the article required. Each of these patterns should be legibly stamped with a number or mark; the swage in which it is made being identified by the same number or mark, and having, in addition, stamped upon it the size of iron required to make the forging. Arranged systematically in this way no time is lost by the workman in selecting the proper tool, nor in experimenting to determine the size of iron necessary for the purpose.

The following may illustrate this point and show, at the same time, a useful adaptation of the ball forging. Fig. 44 represents an ash pan shaker, lever end. To make this we use the ball, Fig. 45, A. The tool for this, similarly marked, also shows at a glance the stock required, Fig. 45, B.

The stock of ball is just of sufficient size to fill impression in auxiliary tool, Fig. 46, A, to which it is immediately transferred from ball tool and completed in one heat as shown in Fig. 44. Part A, Fig. 46, is made from a piece of 8-inch steel driving axle, the hole punched or drilled, as convenient. A forged band, with handle is shrunk on to strengthen the tool and facilitate handling. B is a

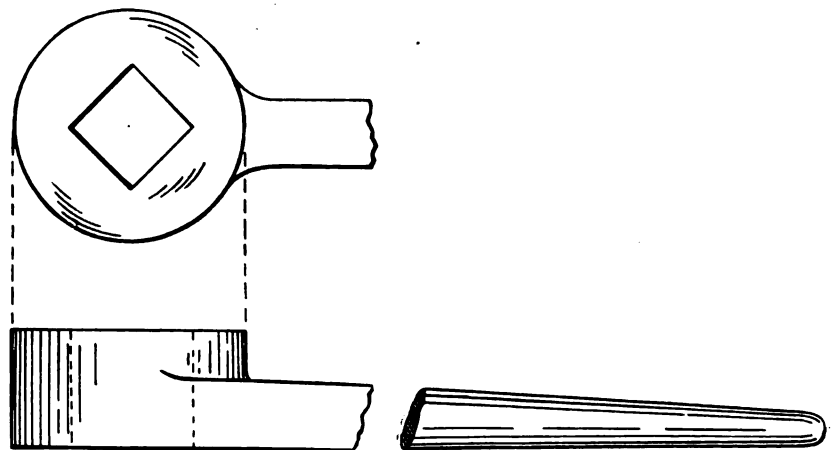


Fig. 44. FORGING FOR AN ASH PAN SHAKER.

crosshead pins, knuckle joint pins, pop valve spindles, eye bolts, hand-hammers, and many other standard forgings, according to requirement. These tools may also be made as elaborately or inexpensively as circumstances permit, but, as in the first instance, their value

hardened soft steel washer machined to fit into part A from bottom; the relative position of square hole in this and in guide plate C being secured by dowel pins in top and bottom.

The thickness of forging can be increased or diminished, and a larger or

smaller hole secured by having duplicate parts of B and C adjusted accordingly. The welding of $1\frac{1}{4}$ -inch shank to forged piece completes the job.

The application of this tool will, I trust, appear plainly, from reference to perspective sketches of its several parts. When in use the washer B is inserted in bottom of tool A, the square hole in same being temporarily plugged by a small piece of square iron, which is allowed to drop out after the ball has been

falo, and by Mr. F. Howard Mason, Chamber of Commerce. The report of the secretary showed thirty-nine new members since last year, and a total membership of three hundred. The various subjects assigned for consideration at this Convention were thoroughly discussed, the greatest interest being displayed on all topics. Among the subjects under discussion were the repair of frames, the preparation and working of scrap for locomotive forgings, oil as fuel

Locomotive Works at Boston, which firm at that time employed about 600 men and put out about four engines—half brass polished pilot bars and smoke arch braces—a week. After this he worked in several of the principal shops of the east, among them the N. Y., N. H. & H. R. R., where he had charge of the night crew.

Mr. Lindsay worked for the United States government at the Watertown Arsenal for three years until politicians got to wrangling about appropriations to carry on the work of coast defenses, and adjourned, making no provision for the 600 men who were thrown out of employment. Ten days later he accepted his present position as foreman of the Evansville & Terre Haute R. R.

High Speed Steel.

It is not my intention to present tables showing the high speeds, heavy feeds, or the amount of metal removed from certain pieces in a given time with this high duty steel, but rather to state a few facts that have been gleaned from daily practice which may be helpful to some in gaining a higher degree of efficiency from their tools. These high records are usually tests made under favorable conditions, and are rarely maintained any length of time in daily practice. It is sufficient to say that the gains are so large in using this steel that it would show poor business tact if we did not take full advantage of it regardless of its present high price.

In 1901 patents were granted Messrs. Taylor and White for a brand of steels alloyed with tungsten, molybdenum and chromium in certain given proportions, also a special heat treatment for the same. The edge holding power of tools made from this steel and given the special heat treatment exceeded all previous attainments to such an extent that it required the reconstruction of certain machine tools to use the steel up to its limit.

Mr. Taylor was superintendent of the Bethlehem Steel Company, and he was testing the relative merits of the standard brands of self-hardening steel when one brand failed to give results as represented.

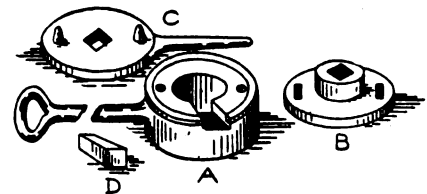


Fig. 46. TOOL FOR FINISHING.

The agent for the steel being apprised of the failure, determined to investigate the cause, and readily discovered that the heat treatments were much lower than he had recommended them to use.

By complying with the instructions the tools were forged and quenched at a much higher range of heats, which resulted in a marked increase in the efficiency of the tools. Encouraged by these results, he tried other brands by heating them to this same range, but finally carried the heats

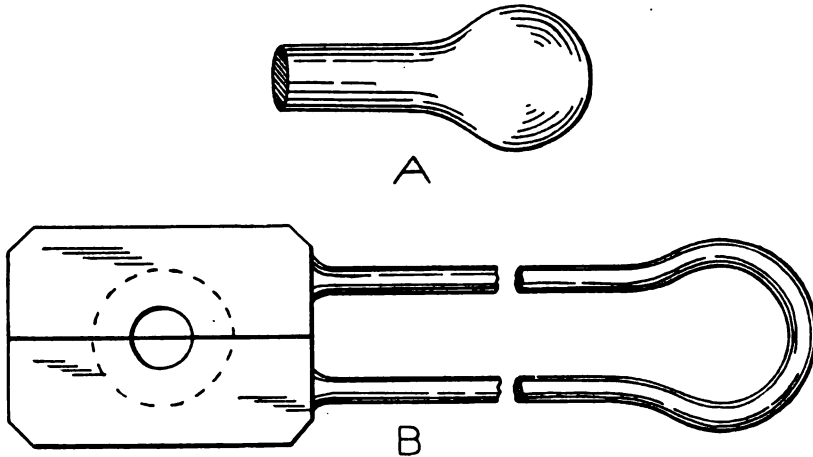


Fig. 45. ASH PAN SHAKER FORGING. TOOL FOR FORMING BALL.

flattened to shape. The guide plate C is then adjusted upon top, the punch D inserted and driven through. The whole operation completed in one heat, producing a clean-cut, uniform, substantial forging at a very low cost.

(To be continued.)

National Railroad Master Blacksmiths' Association. Eleventh Annual Convention.

The annual convention of Railroad Master Blacksmiths was opened Tuesday morning, August 18th, at the Genesee Hotel, Buffalo, N. Y. Owing to the absence of President McNally because of sickness, Vice-President Lindsay presided. The convention was well attended and most successful in every respect. Sessions were held Tuesday morning and afternoon, Wednesday morning and evening, and Thursday morning. On Wednesday afternoon the members went on an inspection visit to the New York Central Railroad shops at Depew, N. Y., on Thursday afternoon to the Pullman Car Works at East Buffalo, and on Friday to Niagara Falls. A very pleasant program was arranged for the entertainment of the ladies. The photograph which was taken of the members will be reproduced in the October issue of THE AMERICAN BLACKSMITH if possible.

Addresses of welcome were delivered by Councilman John J. Smith, of Buf-

falo, and by Mr. F. Howard Mason, Chamber of Commerce. The report of the secretary showed thirty-nine new members since last year, and a total membership of three hundred. The various subjects assigned for consideration at this Convention were thoroughly discussed, the greatest interest being displayed on all topics. Among the subjects under discussion were the repair of frames, the preparation and working of scrap for locomotive forgings, oil as fuel

for axle work, piece work, machine forging in car and locomotive work, tool steel flue welding, track tools, tuyere irons, case hardening, frogs and crossings and car and locomotive springs. The discussions of the papers as read were particularly interesting. The following officers were chosen for the ensuing year: President, George Lindsay; first vice-president, T. F. Keane; second vice-president, James Reiley; secretary and treasurer, A. L. Woodworth; chemist, G. H. Williams. After numerous ballots, Indianapolis was chosen as the meeting place for next year's convention.

We reproduce herewith an engraving of the new president, together with a short sketch of his life. We also append some of the papers, and in the October AMERICAN BLACKSMITH, will be printed some of the other most interesting of the papers read before the convention.

Mr. George Lindsay, the newly elected president of the National Railroad Master Blacksmiths' Association, was born and reared in Fifeshire, Scotland. At the age of sixteen he was bound as an apprentice to John Barrowman & Co., manufacturers of agricultural implements, serving four years, eleven hours a day, at a salary of \$1.50 per week, and boarding himself.

In 1873 he sailed for the United States and accepted service with the Hinkley

to that point where the steel softens or crumbles (between 1,900 degrees and 2,000 degrees F.), if touched with a rod. As all the self-hardening brands vary considerably in composition, so did his final results, but the increased efficiency of some brands was surprising. He concluded to push his investigations a little further and see if a steel could be made that would give better results than the self-hardening when given the high heat treatment. By enlisting the assistance of Mr. White, a chemist, they eventually produced the remarkable steel that bears their names.

It is with interest that we note the rapid trend of events; it is a trifle over two years since this remarkable steel was patented, and to-day it is scarcely heard of. Spurred on by the successes of this new rival, the leading steelmakers were soon upon its heels with a superior steel, willing to sell to all, requiring no expensive shop right to use it or the signing of a binding contract, consequently it was forced to retire before it was generally introduced.

It is well known that if tools for planers, slotters, etc., were made from the self-hardening steels of the past (Taylor-White included), there was a decided tendency of the cutting edge to crumble, especially when cutting hard, tough materials, thereby leaving a rough finish. The construction of the above mentioned machines are such that, during the time they are retrieving, the cutting edge of the tools are required to drag back over the surface just cut, then the machine being reversed, the tools suddenly enter the work at full speed and full depth cut.

Therefore it must be obvious that tools working under these conditions, and required to maintain a good cutting edge, must be of the highest quality, and not the least friable. It is under these trying conditions that this new steel has easily demonstrated superiority over those of the past. Another advance is the manufacture of twist drills from this material; the results are very encouraging for a better drill in the near future. It is true they are not equal to the carbon steel drills in strength; there is a tendency to split through the center, but if the workman exercises his good judgment, there will be very little trouble from this direction. Taps, milling cutters, reamers, etc., are being made and used with some success, but, like all things in their incipency, there are some failures. There are good reasons for believing that in strengthening the teeth, improving the methods of hardening and regulating speeds and feeds to suit the new conditions, they will be a decided success. It will be observed that the cutting edge of tools made from this steel (or in fact any of the alloyed steels) soon becomes slightly rounded, and in this condition they appear to render their best service. This peculiarity makes it unsuitable for finishing tools where keen and enduring edges are required; for instance, a tool for chasing a standard tap must cut perfectly smooth and accurate the full length of the tap; if not, the tap would be worthless. This is one of the reasons why the alloyed steels are a failure for edge tools.

The process of annealing can be easily accomplished by any of the methods employed with the self-hardening brands. A

sure and safe method is to pack the steel in an iron box or a piece of pipe and surrounding the steel with powdered charcoal, then well-sealing the openings with fire clay. The box or pipe is placed in the furnace, heated to a bright cherry red color for several hours, then permitted to cool down slowly; the slower the process of cooling the softer will be the steel. If properly annealed, it will machine as easily as tool steel. It has superior forging properties when compared with the self-hardening steels of the past which allows it to be forged into the difficult shapes. Furthermore, this has been quite an advantage to the steelmakers in producing a steel almost free from seams. In order to forge it successfully it should be heated to a good lemon color heat, taking care to heat it slowly and thoroughly in a well burnt coke or coal fire. If heated properly it will be in a perfectly plastic condition and the steel will flow readily under the hammer. Remember it cools down much more quickly than carbon steel and when slightly cooled it becomes hard and unyielding; far more can be accomplished in a given time by frequent heating and only working it in a perfectly plastic condition; furthermore, if this is observed strains and ruptures will be avoided. It is absolutely necessary that the base of all tools should be perfectly straight, and the attention should be directed to this important part before the tools are finished. By heeding this caution it will save the loss of many valuable tools, besides the tools can be held more firmly and rigidly in the tool post. After forging the tools it is advisable to lay it down and allow it to grow cold, then re-heating for hardening.

Probably the most interesting and important part in manipulating this new steel is the process of tempering it. To temper the steel properly it must be heated to a fusing or welding heat; the conditions required are about the same as for welding tool steel. The methods used in applying the heat are very important, regardless of the advice to the contrary. To obtain satisfactory results, it is best to build a covered fire with a liberal amount of crushed coke over the tuyere, thus avoiding an oxidizing fire. The blast must be used rather sparingly, for if time is not allowed for the steel to conduct the heat properly the point of the tool may burn off, or the coke over the tuyere will burn down to such an extent that it will allow the blast to impinge too strongly against the steel, and thereby prevent the proper conditions from taking place. If the steel is heated too quickly and to the highest possible temperature, the fractured piece will show a dry, brittle, lifeless structure, proving that deterioration has taken place, consequently there will be a corresponding loss in edge-holding power. When the steel is carefully heated in a fire as above mentioned, and a white heat has been attained, a faint fluxing will be noted; as the temperature increases, innumerable minute bubbles will be observed; by prolonging the treatment the bubbles become larger and less numerous; when carried to the extreme the steel will finally soften and melt. This part of the process, for the want of a better term, has been called "sweating" which it somewhat resembles.

The "sweating" properties are more pronounced in some brands than in others,

besides some steelmakers recommend a longer sweating than others, but if the smith is guided by his trained judgment and observation, he will soon learn to regulate the sweating to meet the requirements. Although not generally known, these sweating properties are inherent in all steel, and some of the old self-hardening brands can be improved considerably by this treatment, providing the sweating is not carried to the extreme. The toolsmith, to be successful in his business, must have a well-trained eye; he is required to work in all degrees of light, and at times it is with difficulty that he locates the proper hardening heat. The locating of these high sweating heats will place a greater strain upon his eyes, and will make his position more difficult and important than ever.

After sweating, the tools are quenched in oil, the compressed air, or a strong blast. There are other methods, but they are not used to any extent. In some cases it is advisable to draw the temper, and this can be accomplished by cooling the point, drawing in the usual way, or they can be cooled in their entirety and then drawing the points by conducting the heat from the other end of the tools, and then permitting them to cool down slowly. In order to harden taps, mills, reamers, etc., successfully, they must be heated in a lead bath, and a graphite crucible is absolutely necessary, for the lead must be heated to a white heat or to the highest possible limit. The lead should be covered with powdered charcoal, to prevent it from wasting or oxidizing.

My experience with this new branch of the art is somewhat limited, but I readily discovered that when a smith's forge is used, caution must be exercised in heating even the best graphite crucibles to this high temperature. If the blast is too strong the crucible will melt away in spots before the lead is hot enough to meet the requirements. The tools should be previously heated in a furnace to a bright red heat, then placed in the white hot lead. After the proper heat is obtained, the tools are submerged in the oil, and when cold, they are polished and drawn the same as carbon steel tools.

Some of these steels refine equally as well as carbon steel, if the sweating is not carried to the extreme, and it is necessary that tools like milling cutters, reamers, etc., be hardened from this refining heat. We have been led to believe that the steel cannot be injured by overheating, but when we see a number of tools made from the same bar of steel, and some of them giving extraordinary results, and the others a complete failure, it is quite evident that the heat treatment is a point that needs the closest attention.

There are special furnaces upon the market for sweating this steel, and it is claimed they are giving good satisfaction. It will be noticed that in grinding any of the alloyed tool steels, the emery wheels become glazed very quickly. It is believed that the alloy tungsten is responsible for this sudden glazing; the little grains of emery from which the wheels are composed, become dull and then coated with the tungsten; hence the glazing. The tools are often ground upon these glazed wheels, and this inattention has caused the loss of many

valuable tools, and I dare say that one-half of the tools ground on these wheels are injured to a greater or less extent. As a rule the workman takes no account of this glazing and bears with greater pressure as the wheel fails to cut, thereby causing an intense friction; this creates unequal expansion and contraction, resulting in numerous surface checks.

This can be avoided by replacing the wheels with others that are softer and coarser, then dressing them as soon as they show the least indication of glazing, and the workman limiting the pressure according to the cutting power of the wheels. The sparks emanating from the majority of these high speed steels, when ground upon the emery wheel, are of a bright orange color. The sparks emanating from the old self-hardening when ground are dark-red in color. The sparks being much lighter from the high speed steel is due to the presence of molybdenum and chromium. In one or two brands, I noted the sparks were very light, and resembled the sparks emanating from machinery steel. H. W. RUSHMER.

Case Hardening.

As chairman of Committee on Case-hardening I followed the rule of writing each member of the committee, asking their views on the subject, and with the exception of two, they also followed the rule of not replying, consequently we have no report of the full committee. I will read separately the paper of the chairman and those received from the two members interested.

In mechanics, the term case-hardening means the converting of the surface of iron into steel, for the purpose of creating not only a better wearing surface, but to lessen friction as well.

In the writer's opinion, the best material to be case-hardened for guides, links, link litters, blocks and saddles, eccentric rod jaws and all motion work, is Number 1 fibrous hammered iron. In preparing this iron, the pile should be large enough, the heating perfect, and the manipulation under the hammer sufficiently skillful to produce a refined, perfectly welded iron, free from longitudinal seams, or sheared fibres, frequently caused by disregarding these essentials.

We do not think it advisable to use granular iron for any purpose where case-hardening is required. To do so would greatly depreciate its reliability, owing to the shortness of its initial structure, nor would we recommend Merchant bar iron with its rawness, lack of density, and containing as it does, too great a percentage of slag; all of which, once working or forming into shape, will not fully rectify.

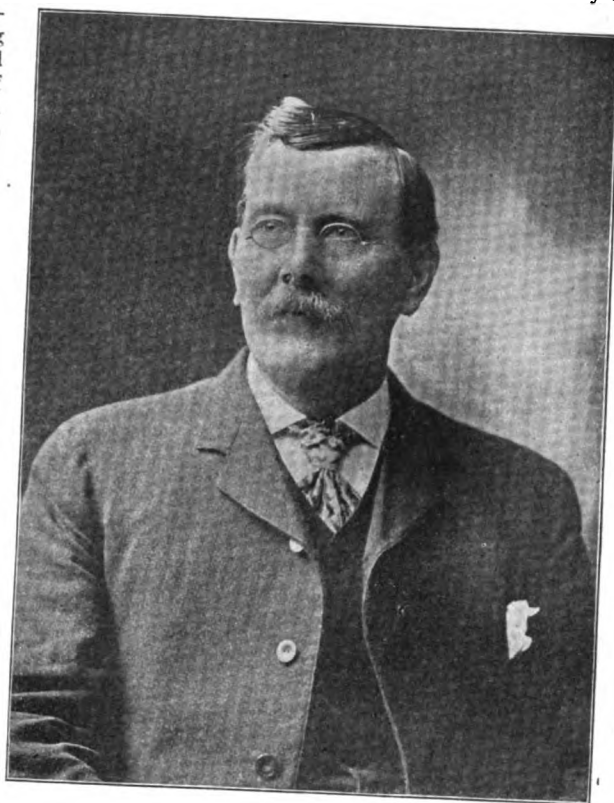
The penetration of carbon depends upon the medium used, the compactness of the iron, and the length of time subjected to a temperature of about 1,550 degrees Fahr. Guides made of good hammered iron should remain in the carbon, after becoming red-hot, from twenty to twenty-four hours. A carbon penetration of $\frac{1}{8}$ of an inch or even

$\frac{1}{4}$ inch is none too deep for them. Lighter articles, such as links and all motion work, will have the proper penetration of carbon, $\frac{3}{4}$ of an inch, after being held at the right temperature for from fifteen to sixteen hours. The proper temperature for case-hardening runs from 1,550 to 1,700 degrees, and can be easily recognized by the experienced eye. There are no railroad foremen-smiths who should not be perfectly familiar with the proper temperature or low shade of red heat for steel-hardening and annealing purposes, which runs from 1,400 to 1,500 degrees Fahr. The best results in case-hardening are obtained with a temperature almost bordering on the bright cherry red, or any degree of heat, as stated above, from 1,550 to 1,700 degrees Fahr. If we are

whose explanation at our meeting in Pittsburgh, Pa., in 1894, as to the results he obtained from using granulated raw bone prompted me to give it a trial, and I am still using it in preference to anything else on the market or home made. It is cheap, always ready for use, easily handled, does excellent work, and all the rats in the neighborhood will grow fat on it if you do not protect it.

As to furnaces for case-hardening purposes, there is no doubt that some are more convenient than others, yet with any kind of furnace, when the same medium is used and same uniform temperature and time observed, the results will be equally good. In the shops I have charge of we use the style of furnace in use in most railroad shops; inside dimensions 8 feet x 2 feet x 6 inches, built of fire brick, incased with old tank plates, and three 3-inch perforated pipes running through the bottom lengthwise. We use coke as fuel. Our boxes are cast iron, 10 inches x 10 inches x 36 inches for motion work; for guides, etc., 12 inches x 12 inches, 60 inches to 70 inches in length. We pack in the customary way, alternating layer after layer of raw bone and the iron, placing cast lid on the box and seal with fire-clay. We also insert two test pieces of $\frac{1}{4}$ -inch diameter iron through the end of the box, and withdraw one at five hours, the other at six hours after placing box in furnace. We then know the temperature of contents of box, and date our time limit accordingly. We quench in water, tank 42 inches diameter by 6 feet long, let in the ground level with floor line, with inlet pipe at bottom end and overflow pipe at top.

[The conclusion of this report on Case Hardening, as presented by the Chairman, Mr. A. W. McCaslin, will be printed in the October issue—EDITOR.]



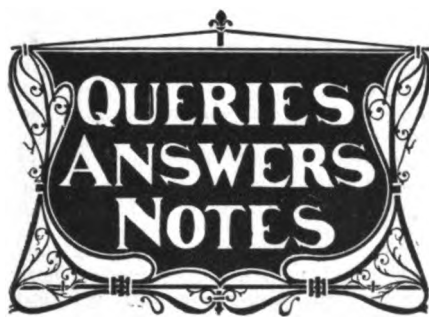
GEORGE LINDSAY,
PRESIDENT OF THE F. R. M. B. A.

practical men, and not color-blind, the pyrometer is not a necessity. They are unreliable and are mostly used for experimental purposes, as they are gradually destroyed by use, and the responsibility of detecting their false indications is left to the eye and judgment of the practical man operating the furnace. If the man is reliable and the pyrometer only his distant second, why burden him with an uncertainty?

As to the medium for case-hardening, some use charcoal, some carbonated bone black and some use a compound of yellow prussiate of potash, soda-ash, salt, etc., and each get fairly good results. It is claimed that old leather belting, old shoes, etc., will meet all requirements as a case hardening medium, but it would bare-foot Uncle Sam's whole army to furnish enough old shoes to case-harden the engine motion work on one of our many railroads of today. I have used many mixtures to coat iron with steel, and wish to acknowledge my indebtedness to Mr. John Buckley, of Chicago, Ill.,

A Few Arguments for New Tools.

Are you progressive about new tools, or are you doing your work by "main strength and awkwardness"? There are mighty few mechanics who can get along these days with the tools of their grandfathers. In the first place there is the saving in time which comes from improved tools, and time is money. New tools and machinery take much of the hard labor from a man, and especially is this true of power in the shop. New tools enable the smith to turn out more work and better work. They are one of the best kinds of an advertisement to draw new trade, for customers seek and patronize the up-to-date, progressive man. There are men who work hard, early and late, but who look upon improved tools and labor-saving machines as useless, new-fangled things, and then wonder why their industry is not better rewarded.



The following columns are intended for the convenience of all readers for discussions upon blacksmithing, horseshoeing, carriage building and allied topics. Questions, answers and comments are solicited and are always acceptable. For replies by mail, send stamps. Names omitted and addresses supplied upon request.

A Question of Emery—What is the best way to put emery on a cloth polishing wheel? **W. M. EXLINE.**

A Good Side Line—We handle farm machinery on the side, and find it a very paying business. The blacksmith is naturally adapted for this line, and all made is clear gain. **A. W. STRONG.**

Lack of Apprentices—There are five shops in this town in Minnesota and not one apprentice. Can anybody tell why this is—why the number of apprentices to the trade is steadily decreasing? **H. W. STRONG.**

Tempering Mill Picks—In reply to J. F. Tramor, as to tempering mill picks or axes, would say that if he will take a half barrel of rain water, a half bushel of salt, a quarter pound of salt petre, and draw the temper to pigeon blue and cool in the same water, I think he will have no trouble in tempering axes, mill picks, butcher knives and so forth. **IRA A. MUNSON.**

Foot Power Machinery—In answer to G. P. Blanchard's question as to whether it would pay to have foot power machinery, I would say yes, certain kinds of machines pay. For instance a band saw will pay, you can rip, cross cut and circle cut. Also a small lathe and emery stand I have found profitable for foot power. I have gone through the mill starting with foot power and afterwards using other power for many years. I have a Weber Gas Engine, which as a rule does very well, but sometimes it goes on strike, but I am getting better acquainted with the mechanism, so I have less trouble than at first. **J. H. JENSEN.**

Cutting and Preserving Wood—A good way of preserving wood is to cut it between August and October. Remove all the branches, leaving only the leaves at the top. Carefully cut or saw the trunks, so that the pores remain open, and place them upright in tanks of water into which has been thrown about one pound of cupric sulphate for 12 gallons of water. **A. C. S.**

A Few Remarks on Prices—I think we are very much in need of a Lien Law. I am in favor of the union of all blacksmiths and horseshoers, for mutual protection, and to restore prices, at least, to a living basis. Think of it! Hired labor \$3.00 a day,—Piedmont coal \$16.00 per ton, and 16-inch plow shares only 15 cents each. This shows something of our present condition. I hope we shall meet with success in securing protection. **B. F. DOUGHERTY.**

How Build a Varnish Room?—I desire to know how a varnish room should be built for the use of a jobbing shop painter, where it is necessary to paint from five to eight buggies at a time. I have a shop 25 feet by 40 feet, two stories high. I have

used the upper floor for a paint shop, but I find that I need a varnish room too. Will some brother smith advise me how large it should be, and how much light it should have, also, how it should be planned and equipped? **C. D. BRIDDELL.**

A Shaper—Will some one who has a shaper for shaping wagon fellos and buggy rims kindly let me know through these columns how the same is made? I will be glad to give any brother smith the necessary information to make a forty-inch drill press self feed, also a band saw, if desired.

With regard to the question as to whether foot power machinery pays, would say that it does not. Buy a Dempster gasoline engine, six horse-power, and then the machinery. Buy a Barnes Lathe 5½x7-foot bed, and then you can make the rest of your machinery all right. **W. M. EXLINE.**

A Number of Questions—I should like to know a good and easy method of making a die to forge tumblers for gun locks, one that does not have to be filed so much before it will fit.

What is the best way to drill into the end of a rod to keep the hole straight in order to make screw joints in rods and tool handles?

Also what is the best way to make a die for forging adjustable boxes or bearings, so that they can be adjusted when the shaft or spindle has too much play?

I am interested in machinery, and as some of THE AMERICAN BLACKSMITH's readers have made some machinery, I think some one will answer my questions. **WM. DUFF.**

A Question from California—We have the latest improved machinery, including a Champion blower No. 400, which gives good satisfaction, a Champion drill, No. 7, a Western Chief drill, a Champion Columbian tire bender, No. 1, a Stoddard tire up-setter No. 2, and a Champion Star vise axle up-setter and welding machine No. 2.

Our line of work here is horseshoeing, new wagon work and repairing of all kinds, the most important being the making of steel wedges for logging in red woods. We make both wedges and sledges. They must be tempered to stand at least two or three years without seeing a mark. The wedges are made of 8½ by 1½-inch iron. Please let me know what horsepower it would take to drive the hammer and what kind of hammer would be best for this work. **EMIL SEMAN.**

A Useful, Simple Recipe—For granite tools, that is, tools or chisels used by granite or marble workers for cutting inscriptions on tombstones, the following recipe is especially good: When dressed, heat to a red heat and harden in the following solution: one gallon of soft water and four ounces of salt. Draw the temper to straw color.

When a man understands these tools it is easier to prepare them. They require an unusual hardness. The hammer used in cutting is very small, and the blow very light, therefore, it will stand a high heat and temper. The chisels should be very thin for this work. When dressed and ready to harden, heat to a red heat. **W. Z. M.**

Cutting Timber—I will give my experience as to the proper time of the year to cut timber, such as hickory, ash and oak, the principal timbers used in wheel work. This is in the spring, just when the leaves are opening, say the size of a squirrel's foot. Cut your trees and let them lie a month at which time the leaves will have enlarged, drawing all the sap out of the trunk. Next cut up, saw and pile in a dry place where the wind can blow through. You will be surprised when working to find no trace of borers. It is a mistaken idea to think the sap ever goes out of timber. Whoever tries this method will find tougher

timber and much more durable, the first cause of decay having been removed and its life lengthened. **JOHN DOWSWELL.**

Contraction—In most cases only one side is contracted and therefore just the contracted side must be expanded. As a general rule the toe is wide enough, and if both sides are contracted they want to be spread just at the heel or as far as it is contracted. Now M. Koepplinger's plan in July paper expands it all around.

I use a Burden horseshoe and punch extra holes in the heel part, then I make the shoe a little weaker where the hoof starts to turn under. Sometimes between the second and third nails from the heel, sometimes between third and fourth. Take a good deep hold with the heel nails, and when the shoe is driven on, spread with a tongue or spreader till the horse flinches. I trim all the bad hoof off the contracted side and raise the shoe on that side either with leather or a high heel so as to make the horse stand level. I had sixteen years experience and for the last three years have been treating contraction this way. With three times shoeing the hoof will be all right. If one side is contracted you can burn the other side a little with a hot shoe. This will hold it back a little from growing so fast, but don't burn the contracted side. I have used this method successfully. **A. H.**

Words From Distant Lands—I am working on a mine in British Columbia, but I have some horses to shoe. There is also one mule. I shoe her so that I can see the outside edge of the shoe, and I have been told that I should set the shoe under the foot and then rasp the foot off some. I do not know whether I am right or wrong. If a brother smith could tell me anything about it, I should be glad. As far as THE AMERICAN BLACKSMITH is concerned, I would not be without it for anything. Horseshoeing is what I like best, and I think your books are just right as far as I can see. I have tried different things in shoeing which I saw in your paper and they have proved A 1, so I do not intend to do without it. Could you tell me of a good place where I could take a course of study on the horse's foot, and what it would cost? I saw, some time ago, some talk about a blacksmith's having papers to be a horseshoer, thus to prevent home shoeing. I think this would be the finest thing ever invented, not only to stop home shoeing, but to prevent so many so-called horseshoers from butchering the poor dumb animals' feet. **JOSEPH MCNUTT.**

Babbitting a Journal—In answer to A. J. K. in the July paper with regard to babbitting a journal I would give the following as my method. I would first raise the shaft up just so the babbitt would run around it. Take a piece of pasteboard and cut it out the same shape as the shaft, making the same so that it will cover the journal. To prevent the babbitt from running out, place some brick clay or putty outside of the board. If the journal is in two parts, I would do the bottom half first, and then put on the top with a piece of pasteboard strip between the journal, so that the babbitt will not run together. Bolt down tight and pour. Drill out the oil hole. Don't screw down the top on the shaft. If one piece of pasteboard is not enough, put in as many as are required to make it tight without bearing on the shaft, and you will have a good job. Heat the babbitt hot enough so that it will burn a very thin pine chip. Do not get it too hot, or it will not be a good job. Heat up your journal with some oily waste before you babbitt it and it will run better. Put on three times the thickness of the pasteboard after babbitting, and bolt tight. **M. LAMBS.**

Tempering Rock Drills—In answer to Mr. William Curry's question with regard to tempering rock drills, would say that after the drills are sharpened, lay them down in a dry place to cool, that is, keep the bits away from the ground by putting a bar of iron under them to rest on. When ready to temper, have a clean fire, heat the steel short as possible to an even cherry red by turning the drills quite often. Take out and plunge in a bath of salt water, mixed in the proportions of two pounds of table salt to each five gallons of water. Hold the drill at an angle of about sixty degrees and stir in the water long enough until it almost stops sizzling. Then take out and put bit down in a moist place. This will keep the bit hard, while the heat above will keep the drill from getting too hard in the shank. Remember, it depends more on the heat of the drills in getting a good temper than the water. With a little practice you will find it a first-class and quick method in tempering drills, either Burleigh or single hand steel. I have worked different brands of steel; as Firth, Sanderson Bros., Canton C. & C., and some grades of Black Diamond, and tempered the same for some of the hardest rock in California, but have always had good results from the employment of the above method. WM. ANDERSON.

An Inadvertance and a Fool Blacksmith—In my article on how to lay out an octagon, in the August number, please read wood as well or instead of "iron." When I wrote, it was not my intention to use either word, as, while it related mostly to wood, I once had to round up a square shaft for a bearing with a cold chisel and file and used the wrinkle then. Some might think I alluded to rounding up a square on the anvil in that manner which would be more than foolish. It is a good thing for the wood worker to know and it may come handy to the other fellow as it did to me.

Not long ago as I entered a smithy, my ears were offended with profane language, my nose suggested sulphur and the shop was blue. The smith was at the first one of a set of wheels to set the tire. He had ruined the fellows by trying to drive out the bolts, and cutting the bolts with a cold chisel between the fellow and tire, into which latter they were rusted fast. I asked him why he did not prick punch the heads, take the wheels to the drill and drill out the countersink and then drive the bolts out through the fellow with a punch? His first look was one of surprise, then it changed to sheepishness and then back to rage as he yelled "Fool, fool, foolish fool, — fool, — fool, why didn't I think of that?" The brimstone was too thick and I absconded. JOHN W.

A Chatty Pennsylvania Letter—My shop is in reality the only horseshoeing shop I know of in Blair County, as I do not repair nor do I make or build wagons of any kind. I have for twenty years made it my study to interest myself in horseshoeing only, and believe I have made it a success in building up a trade, as I am well known. I have all I can do, and all the business my shop will allow. I shoe the majority of the light driving horses for track and road use. I don't want nor will I shoe plugs that require number seven or eight shoes, and would not think of shoeing a mule. I get my prices for my work which is a great item you know. We make a great many bar shoes, side and toe weight shoes. We have some very good horses here at present and in these palmy days of prosperity more good ones are coming. I do a nice and a good business in my line, could do a great deal more, but have about all we can do at all times, for which I am duly grateful and satisfied. There are in this city as well as all

towns of our size blacksmiths who want to do it all, that is, do all wagon work and all kinds of work along with horseshoeing, who will sooner or later find that our branch must and will be separated from the other. Our city has nearly 50,000 population, and is seeking metropolitan airs, so of course, we must keep up with the procession, as New York, Philadelphia, Chicago, Pittsburg and a host of others all over the Union have done. B. W. STORY.

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Prices Current — Blacksmith Supplies.

The following quotations are from dealers' stock, Buffalo, N. Y., Aug. 26, 1908, and are subject to change. No variations have occurred since last month's figures.

All prices, except on the bolts are per hundred pounds. On bars and flats prices are in bundle lots.

Bars—Common Iron and Soft Steel.	
3/4 in., round or square; Iron, \$3.10; Steel, \$2.90	
1 in., " " " " 2.70 " 2.70	
1 1/4 in., " " " " 2.50 " 2.40	
Flats—Bar and Band.	
3/4 x 1 in., Iron, \$2.50; Steel, \$2.40	
1 x 1 1/4 in., " 2.40; " 2.40	
1 1/2 x 1 1/4 in., " 2.80; " 2.80	
Norway and Swedish Iron.	
3/4 in., round or square, \$4.90	
1 in., " " 4.50	
1 1/4 in., " " 4.50	
1 1/2 x 1 in., " 4.80	
1 1/2 x 1 1/4 in., " 4.20	

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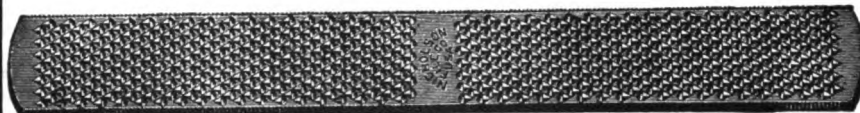
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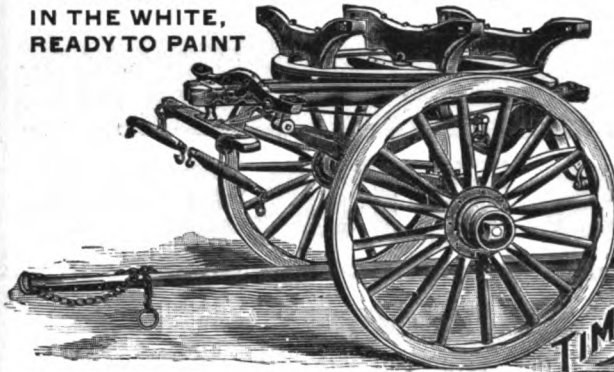
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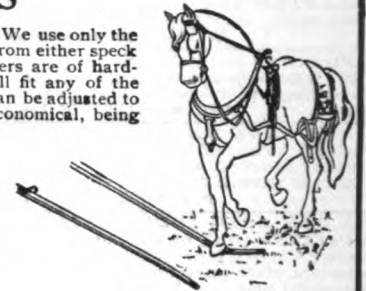
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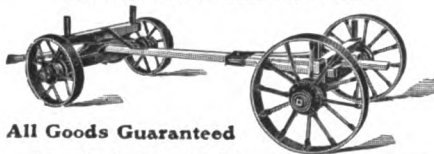
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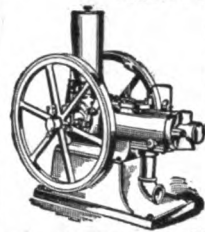
Trade Literature and Notes.

The New Etna Coal Company, Chattanooga, Tenn., send us some interesting testimonials regarding their smithing coal. One of their circulars states that their mines at Whiteside, Tenn., are the only ones in existence whose entire output is blacksmithing coal. One of the mottoes of this company is "A weld made with Etna coal sticks."

The Folding Wagon-Box Company, of Haverhill, Ohio, send us a very interesting set of directions for building a folding wagon-box. They state that this style of wagon appeals to farmers and wagon users, and all blacksmiths can profit greatly by catering to the need for this kind of wagon. Full directions for building the box will be furnished by the above company on application, and will be found of interest to any one engaged in the wagon building business.

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Medal, Pan-American Exposition,
1901. Gold Medal, Charleston,
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Burns Kerosene Cheaper
and Safer than Gasoline.
Automatic, Simple, Reliable.
For Pumping, Electric Light-
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Batteries and All Other
Power Purposes.

Direct Coupled or Belted Dynamo
Sizes from 1 to 60 H. P.

A. Mietz, 128-138 Mott Street, New York.
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send the price in stamps to

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Gasoline Engines

We build them, small sizes, horizontal patterns, new designs, four cycle, hit and miss governor. Speed easily changed while engine is running. Hammer-break electric igniter, only makes contact when governor calls for more power. Highest economy both in fuel and battery power. Perfection inlet valve lock. Full rated power guaranteed. Parts made in duplicate. Prices right. Write us. We also continue to build Portable Forges and Foot Power Grinding Machines.

**CHAPMAN FORGE AND
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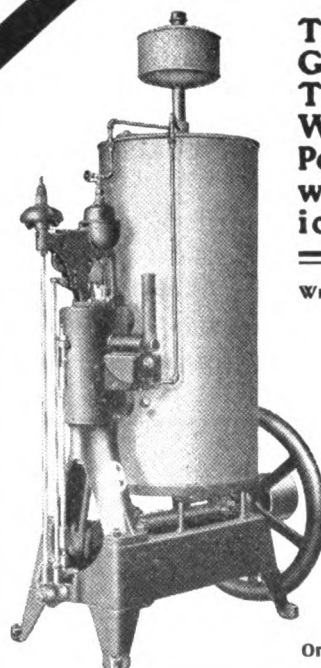
The Little Giant



GAS AND GASOLINE ENGINES

2 H. P. Vertical. 4 H. P. Horizontal. Either tube igniter or electric igniter. Shipped mounted on skids as shown in cut. Also equipped with pumping attachments. Write for booklet describing full line New Era Gas Engines from 4 to 80 H. P.

THE NEW ERA IRON WORKS CO.,
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**The Stickney Junior 3 H. P.
Gasoline Engine works Forge,
Trip-Hammer, Drill, Emery
Wheel, Jointer, Lathe and
Polisher. The Blacksmith
who has a "Stickney Jun-
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Dean & Co., Minneapolis.
S. D. Burke & Co., Madison, Wis.
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Jos. Maw & Co., Ltd., Winnipeg, Manitoba.
Scobie & Parker Co., Pittsburgh, Pa.
Isch & Dittewig, Peoria, Ill.
Clot & Crist Machine Co., San Francisco.
Reierson Machinery Co., Portland, Ore.
Bradley Engineering and Machinery Co.,
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Merrell & Co., Toledo, Ohio.
Griffith & Turner Co., Baltimore, Md.
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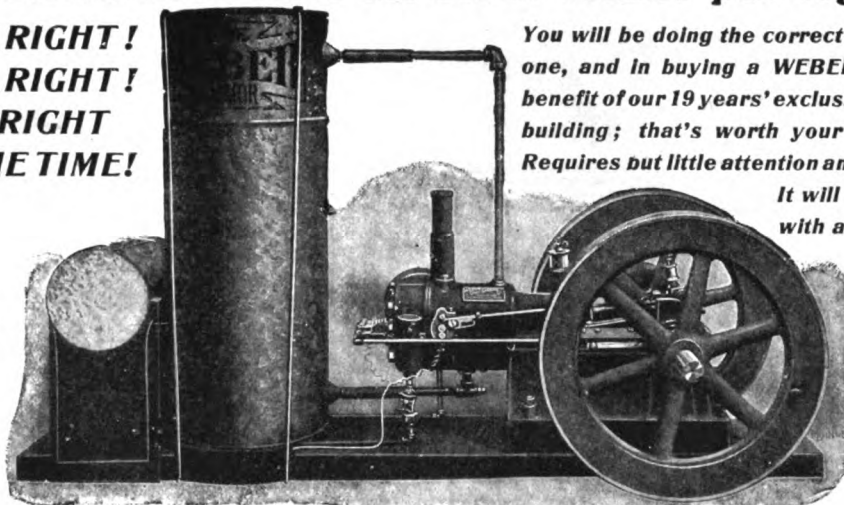
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Weber

More Weber Engines being used by Blacksmiths than all other makes put together

**BUILT RIGHT!
LOOK RIGHT!
ARE RIGHT
ALL THE TIME!**

Solid
Strong
Simple
and
Durable



You will be doing the correct thing to put in one, and in buying a WEBER you get the benefit of our 19 years' exclusive Gas Engine building; that's worth your looking into. Requires but little attention and small space.

It will last a lifetime with a little care.

Powerful
and
Economi-
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The 2½-Horsepower WEBER JUNIOR as it appears at work.

The Junior is shipped (crated) with all fixtures attached ready to set up and run, requiring no pipe fitting or connections.

Over 7,500 Weber Junior Engines now in use!

Our New Catalogue

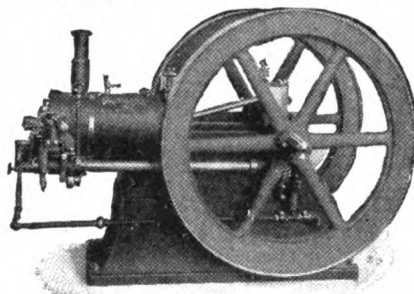
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Wagon
Builder
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have
it.**

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are being bought by blacksmiths all over the country. Just the engine for those who need more power than 2½ horsepower. Have electric and tube igniters, gasoline pump, underground tank and latest improvements. Each engine critically tested and guaranteed perfect.



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We Guarantee

all WEBER engines to be of the very best material and workmanship, and agree to replace any defective part, F. O. B., our own works, without cost for two years. We guarantee fuel consumption and interchangeability of parts.

**All sizes
built
up to
300
Horsepower**

Our nineteen years of experience goes with each "Weber."

Weber Engines operate on one-tenth of one gallon of gasoline per horsepower per hour.

Every Engine Sold is an Advertisement.

Every User of a WEBER is an Endorser.

GENTLEMEN:—I have a 2½ horsepower Weber Gasoline Engine, and it is a dandy. I run a 12 in. x 2½ in. emery wheel, a 12 in. polishing wheel for polishing plow shares and other work, a grindstone, a table for 14 in. rip and cut-off saws, a shaper which carries a 5 in. cutter head, a jig saw, a spoke tenoning and felloe boring machine combined, a No. 2 Bailey power drill, and I have just put in a power blower for four fires. This little engine will run all of these machines at once, except the shaper, which takes more power. It will run it and any other one of the machines. I also have a wood turning lathe. The engine takes off much of the hard work attached to our trade. I doubt if there is any better engine made for power than the Weber. It is safe and simple.

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S. G. MOONEY.

Weber Gas and Gasoline Engine Company

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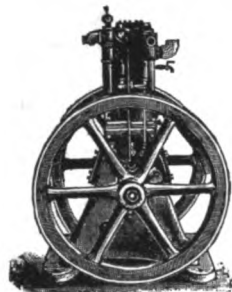
BARGAINS In Rebuilt Second-hand
GASOLINE ENGINES

Good as New

Also New Gas and Gasoline Engines

GET MY PRICES**J. MONTGOMERY JOHNSTON**
216 LAKE STREET - CHICAGO, ILL.**OUR GAS and Gasoline ENGINES** Operate at the least possible expense and your blacksmith shop is not complete without one. It can be started in a moment, requires no attention after starting and will not affect your insurance. Our 3½ Vertical Straight Line Engine will be furnished complete, equipped for gas or gasoline, including hot tube igniter, starting crank, atomizer, gasoline tank, water tank, piping, and fully guaranteed.

\$115 Cash, or \$145 on Time.

LAZIER GAS ENGINE CO.
585-593 ELLICOTT SQUARE
BUFFALO, N. Y., U.S.A.**SIMPLICITY IS A FEATURE OF OUR ENGINES.**

Anyone can start and run them.

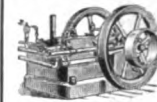
Superior Construction.

High Grade**Gas Engines****AT REASONABLE COST**

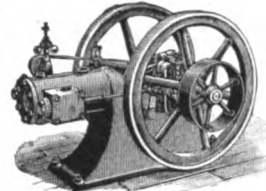
Agents wanted in unoccupied territory. Write for catalogue and prices. Mention the American Blacksmith.

Rumsey-Williams Co., St. Johnsville, N. Y.**HONEST DEALINGS.**

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BUYS THIS
High Grade Double Barrel Shot Gun, equal to any \$25 gun made. **\$4.98** for Single Barrel. Send for catalogue. (Mention this paper.)
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You can start and run our engines for they are the simplest and easiest to understand. Safe, reliable and fully guaranteed. We will save you money on a gas engine. Catalogue free.

A. CANFIELD ENGINE WORKS
BINGHAMTON, N. Y.**AS NEARLY PERFECT AS CAN BE MADE** is what we claim for our
GAS AND GASOLINE ENGINES.

These Engines are the result of twenty years' practical experience, and are unsurpassed for efficiency of operation and quality of workmanship.

OUR CATALOGUE WILL INTEREST YOU.

The FRANK M. WATKINS MFG. CO. 357 Baymiller St.
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"GUS" GAS AND GASOLINE ENGINE

A MODEL OF PERFECTION

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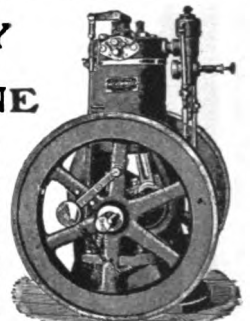
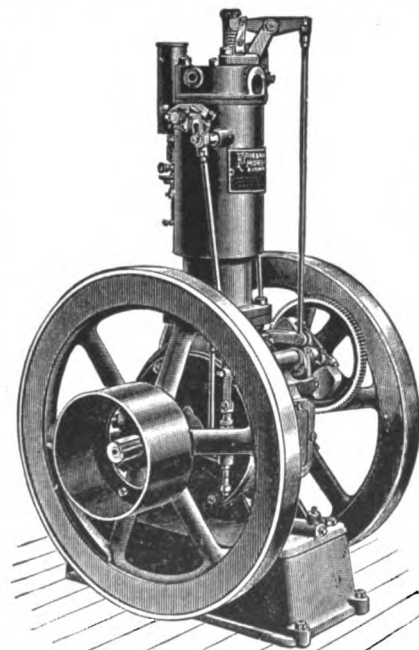
No Power so

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as a Good

GASOLINE ENGINE.

Let us send you our catalogue and quote prices. Our Specialty 1½, 2½ and 4 H.P. State your power needs. If you have a Steam Engine give full description. We sometimes make exchanges.

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Gas and Gasoline Engines**1½ to 54 HP.****Horizontal and Vertical****OUR VERTICAL ENGINES** Are Specially Adapted for Use in Blacksmith Shops.

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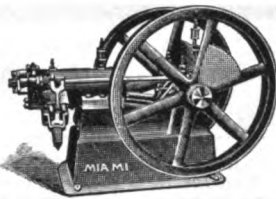
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You would probably get a **CERTAIN AMOUNT OF SATISFACTION** out of any old kind of a gas or gasoline engine. But if you want one to give you better service than a steam engine, and as good service as an electric motor, and cheaper to run than either, get a

MIAMI GAS OR GASOLINE ENGINE.

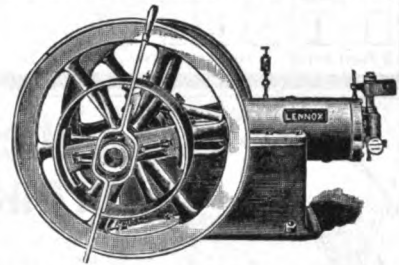
Miami Engines, Horizontal, 5 to 65 H.P., 12 Sizes.
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THE MIDDLETOWN MACHINE CO., Middletown, Ohio.
Write for Catalogue and nearest Agent.



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Manufacturers of the Lennox Stationary Gas and Gasoline Engines for General Purposes



Complete Blacksmith Power Outfits. Shafting, Hangers, Pulleys, Belting and Emery Stands.

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DO YOU realize the amount saved every day in dimes and hard work by having a reliable Gasoline Engine for shop power. We have been making them for years. Our specialty is 1½ H.P. to 4 H.P. Engines are four cycle type, high grade, and fully guaranteed. Write for catalogue "12." Regal Gasoline Engine Co., Coldwater, Michigan

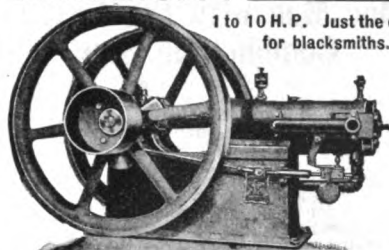
COLUMBUS GASOLINE ENGINES

ARE THE THINGS FOR BLACKSMITHS

COLUMBUS MACHINE COMPANY
Columbus, Ohio.

SIMPLICITY is one of the fine points of the **HARTIG ENGINE.**

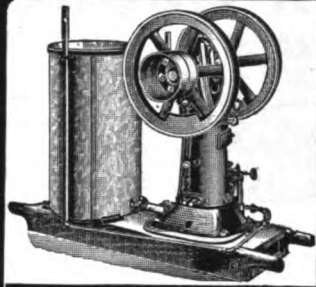
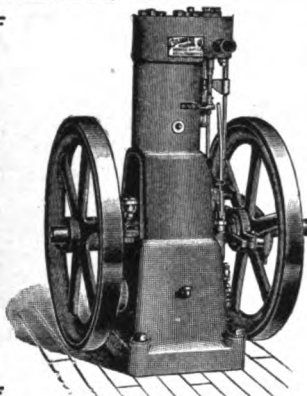
1 to 10 H.P. Just the engine for blacksmiths.



Unexcelled for economy and ease of handling. Prices and Catalogue free on application.

HARTIG STANDARD GAS ENGINE CO.
14 Commercial Street, Newark, N. J.

Send for Catalogue 33 Stating Horse Power You Need.



on application. Write for price and catalogue fully illustrating this engine.
WEBSTER M'FG CO., 2013 WEST 15TH STREET, CHICAGO, ILL.

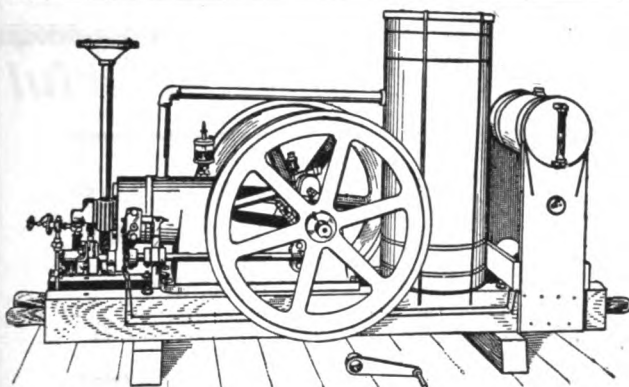
The Many Purpose Power

On account of its compactness, simplicity and adaptability to so many purposes, the

Webster Vertical Gasoline Engine

is indispensable to repair shops, smiths and other artisans. Self-contained and complete as shown in cut. Easily carried by hand to any work to be done. Develops 3 full horse power at a cost of 3 cents per hour. Handiest, safest, most durable little power made, with no end to its uses. Handsome large card, printed in colors, showing this engine at work in shop, sent free

Witte Gasoline Engines



WITTE JUNIOR ON SKIDS.

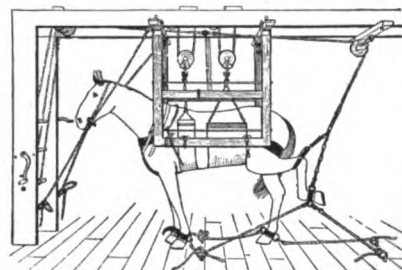
Witte Engines have been made by us for 14 years. That they are perfect is certain or we could not sell them today. Every improvement known to the trade is embodied in these engines and they are also **reliable, economical and durable.** Our works are equipped with all the best labor-saving machinery. Capacity, 1200 engines per year built in several types and

Sold at One Profit from Maker to User.

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Perfect Satisfaction and Insurance Against Accidents

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MARTIN HORSE-SHOEING RACK

The Original Patented Rack. Avoid Imitations and Infringements.

Read what Louis Martin, Wooddale, Ill., writes:

"You say that you will take rack back if it don't give satisfaction. There is nothing about your taking rack back. It is all right. I had a mean western horse in the rack and there was a big crowd around when I roped him up. When I had him hitched in the rack as shown in the cut, I shod him easily, and there is no animal in the world that can't be shod in the rack. Here is the check for the rack and my thanks for waiting. I wanted to give the rack a trial before paying for it. If I order one again I will send the check with order."

NOTE:—We have since sold Mr. Martin another rack for a neighboring blacksmith.

SEND A POSTAL FOR FULL PARTICULARS.

MARTIN HORSE RACK CO.,
Sidney, Ohio.

1	THE L. S. STARRETT CO.	ATHOL, MASS.	U. S. A.	13	14
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2 feet long, $\frac{3}{4}$ inches wide, folding in middle. Made of Best Quality Spring Tempered Steel

BLACKSMITHS Will find this Steel Rule just what they need. We send it post-paid for 50 cents.

Catalogue of Fine Tools Free.

The L. S. STARRETT CO.
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Sold by all Jobbers in the United States and Canada.

Miniature "Aprons" showing material and how made, mailed upon application.

Sole Manufacturer
Edmund C. Beckmann
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Leather Aprons

For the Jobbing Trade.



Samples of Leather and prices on application

The Hull Bros. Co.
Danbury, Conn.

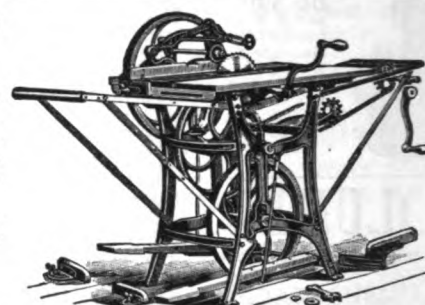
One Man with the Union Combination Saw

Can do the work of four men using hand tools, can do it easier and can do it better.

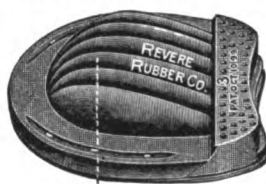
This machine is suitable for ripping up to 8 1/2 inches, also cross-cutting, mitering, rabbeting, grooving, dadoing, edging-up and, with the extra attachments, scroll-sawing, edge moulding, beading, etc.

Machine sent on trial.
Send for catalogue "A," describing our complete line of foot, hand and power wood-working machines.

The Seneca Falls Mfg. Co.
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AIR CUSHION RUBBER HORSESHOE PADS



THE MOST COMPLETE

Line of **PADS** On Earth

Air Cushion, Banner, Acme, Giant, Ideal, A. C. Road, and Racing.

CHEAPEST ON THE MARKET.

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It fills with air at each step.
That's what breaks concussion.
That's what prevents slipping.
That's what keeps the foot healthy.
That's what cures lameness.

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BOSTON, MASS.

Your Hack Saw Troubles

will come to an end if you get the old reliable Universal brand.

Send for our free booklet with hints on the use of the hack saw.

West Haven Manufacturing Co.
NEW HAVEN, CONN.



DOES THE
BEST WORK
EASIEST KEPT
IN ORDER

It is the most Powerful



Does the
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SOLD BY

Bliss Manufacturing Co.

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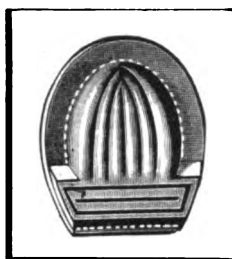
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"TRINITY TRUE"

HIGH SPEED TOOL STEEL

PLENTY OF LATITUDE FOR HEATING. EASY TO MACHINE. NO TRICK IN TEMPERING.
ESPECIALLY DESIGNED FOR HEAVY CUTTING. BEST STEEL FOR HOT WORK.

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OF ITS KIND.

ORDER BY NAME "A. C." THROUGH YOUR
SUPPLY HOUSE.

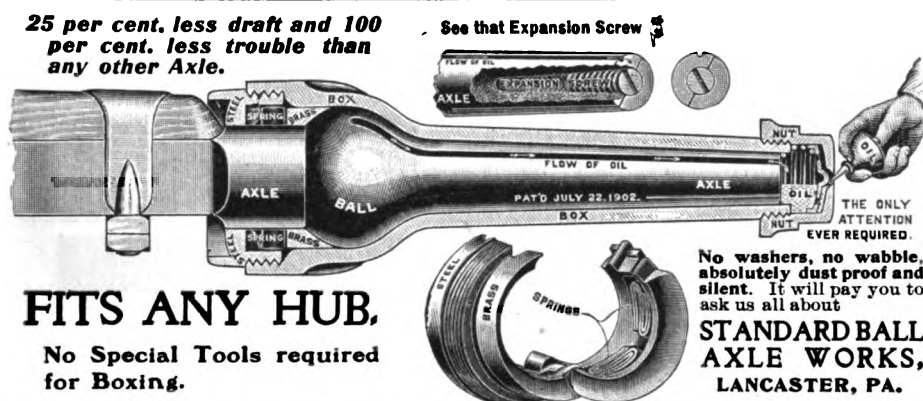
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25 per cent. less draft and 100 per cent. less trouble than any other Axle.



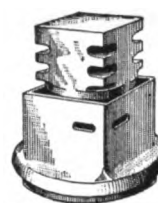
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No Special Tools required
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See that Expansion Screw

No washers, no wobble,
absolutely dust proof and
silent. It will pay you to
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**STANDARD BALL
AXLE WORKS,
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Make old buggy run like a new one.
Sure cure for wabbles and rattles.
Quick seller and very profitable.
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It's the man who knows the most about
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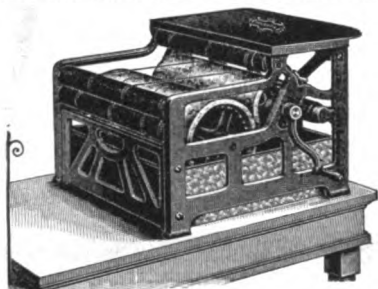
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Plow Lay Welding Machine and Leveling Block Combined



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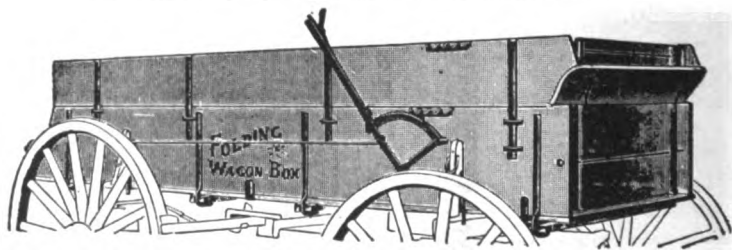
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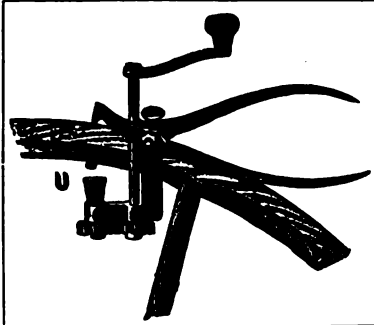
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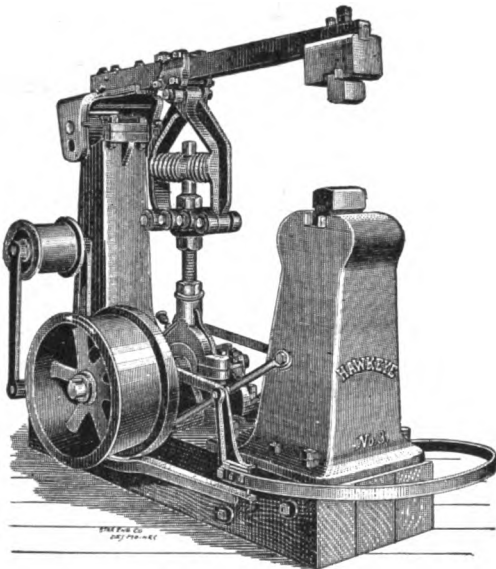
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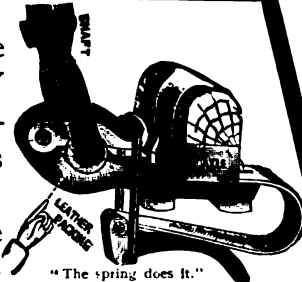
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Automatically
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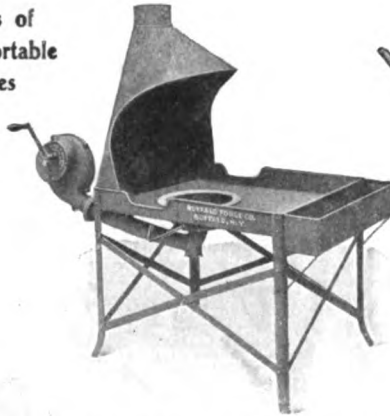
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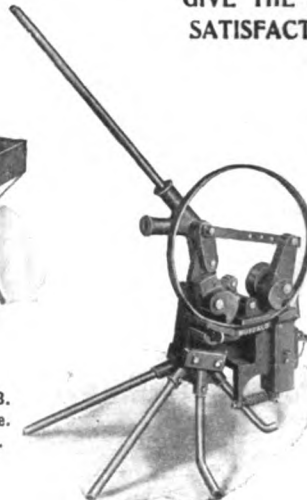


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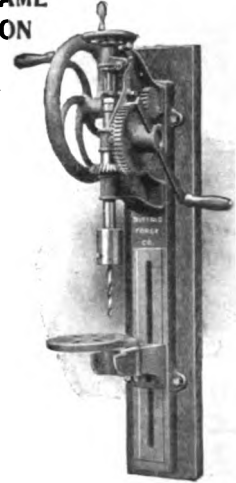


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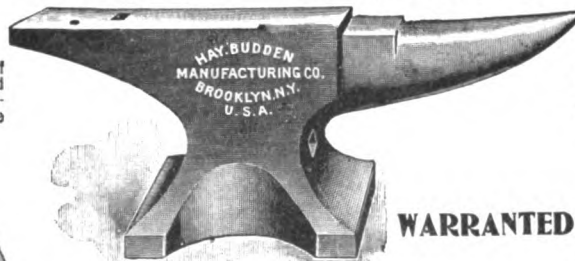
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